

PG MAGAZINE AUSTRALIA

■ Lab Tested: **Big Hard Drives**

■ Lab Tested: **Server
Network Cards**

■ Lab Tested: **Remote Software**

■ Plus: 16-page Buyer's Guide
Top Game Reviews
1998 Shareware Awards

**SAVE \$\$\$
DISCOUNT
COUPONS
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**Best of the
BUDGET NOTEBOOKS**

- 4Screens v1.27
- APK 3dFX Tuning Engine
- Active Calendar
- AddWeb v2.47
- Alexa v1.4.1
- Animated Screen v2.2
- Arachnophilia v3.7 Build 4621
- AriTech INI File Editor v1.5
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- BSshield v1.2
- BS/1 Professional v1.0c
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- CopyPaste v2.12
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- DNEWS News Server (Beta)
- DNTTools v1.0
- DailyNotes v2.0
- Digital Darkroom v1.2
- Dinosaur Coloring Book v1.0
- Download Minder (MSIE Full)
- Drag and View DWG (32-bit)
- DukeMenu v2.0
- EMULIVE FSx Broadcast Server
- EZ-Forms Maker 98F (32-bit)
- Easy Bridge v3.0.2
- EasyCrypto98
- Enquiry Manager v1.0.3.230
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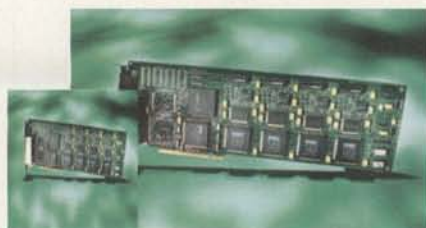
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Premier Downloads This month we bring you GEAR Audio, for recording the perfect CD and Connect Antivirus to save your system from nasties.

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We'll also get you surfing with the full version of Microsoft's Internet Explorer 4.

For full details see page 139

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WIN! One of Three Colour Printers from Epson! Read how well these printers do in this month's inkjet comparison, then win one for yourself. See page 75.

WIN! A Notebook Computer from FIC! The 6100 Series comes with a P233 MMX processor, 64MB of RAM and lots more. To find out how you can win it, see page 107.

WIN! One of ten Initio Fast SCSI Channel Bus Master cards from Peripheral Sources International! For details on how to enter, see page 160.



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The Editor's Choice - Beyond What is your choice ?

"Not only was it the fastest system overall, but it is well rounded and would cope well in both a business and a home environment. so get one while they last."

Editor - PC Magazine, October 1998

"In some of our past labs we've needed to go to the photo to see who has crossed the line first, but this month we have a very clear winner. The Beyond SuperO professional PII impressed the entire team when we set it up due to the high quality of all its components Unsurprisingly, the Beyond also tore through our Benchmark tests, producing a score that not only blew away the opposition but rivalled that of some PII/400 system Incredibly fast and well featured with massive upgrade potential."

Editor - PC@UTHORITY, October 1998

Beyond Professional LX

Intel 333MHz Pentium II MMX Processor

USA SuperMicro SLA LX Mainboard
32Mb SDRAM
Quantum 3.2GB Ultra ATA HDD
Intel i740 Chipset 8MB AGP Video
NEC 15" V500 MultiSync Digital Monitor
Beyond Ergonomic 104 Keyboard PS/2
Beyond SuperO Midi Tower ATX Case
Logitech PS/2 Mouse
3.5" Floppy & 32X CD ROM IDE
Microsoft Windows 98 and IE 4.0

\$1980



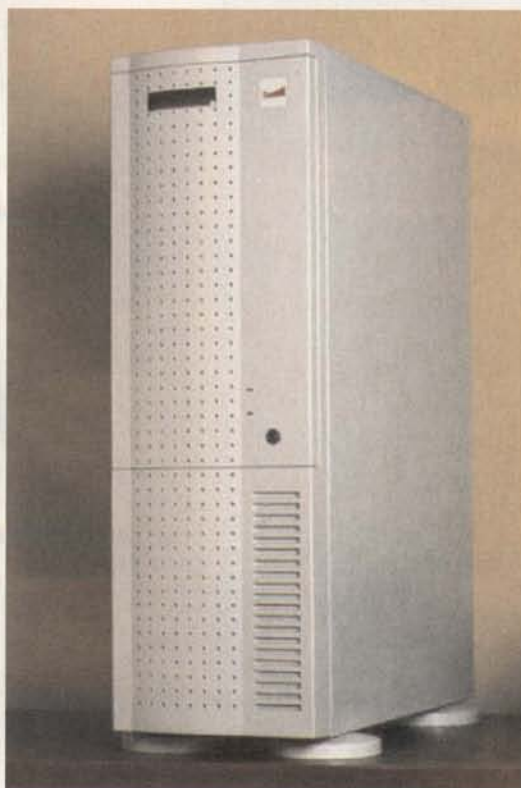
Beyond Speedo BX

Intel 350MHz Pentium II MMX Processor

USA SuperMicro SBA BX Mainboard
64Mb SDRAM PC100
Matrox Millennium G200 8MB AGP Video
Sony 15" Trinitron Digital Monitor 0.25
Quantum 5.1GB Ultra ATA HDD
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Beyond SuperO Award Winning Series



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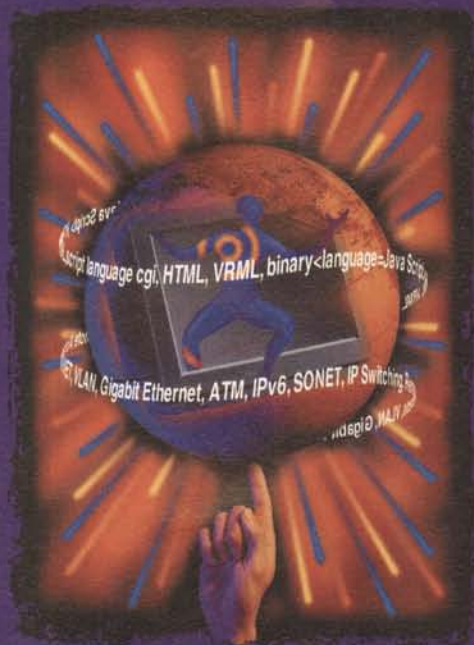
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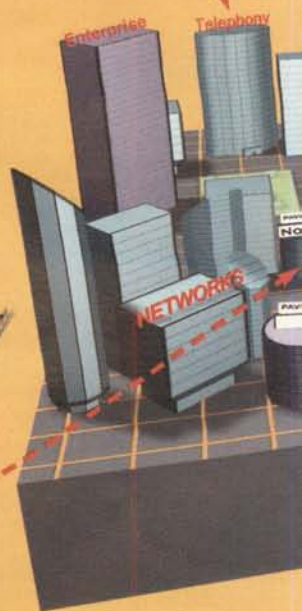
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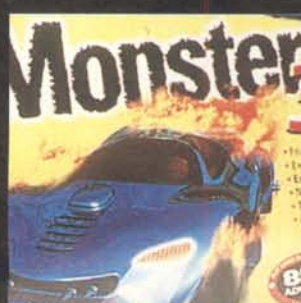
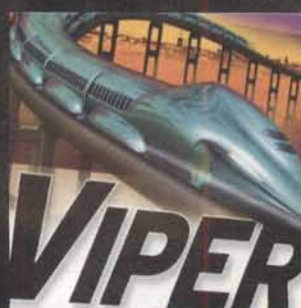
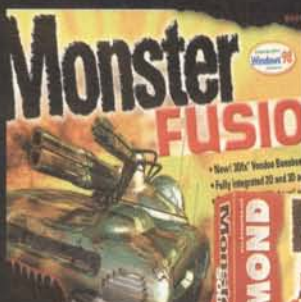
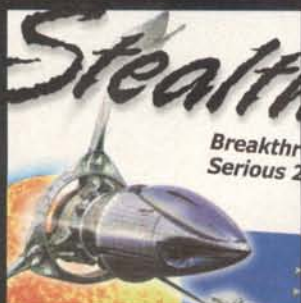
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But Wait, There's Less!

As obnoxious as they are, those TV commercials featuring spokesmen shouting about how much you'll get for how

little money certainly must work, because it seems like they're on pretty much round the clock.

But over the past few weeks, several hard sell television commercials have sprung up advertising very similar products: sub-\$500 PCs.

If these ads are working, it can only prove that it is possible to dupe the public into buying *anything*. What they're selling are computers powered by 486 processors. That's technology that is *nine years old*—a long time in any industry, but in the PC world, that's eons. And keeping in tune with the "retro" processor, the machines come with hard drives capable of storing hundreds of megabytes of data (almost enough to install one of the most recent office suites)!

And that's not all. The computers come with *eight megabytes* of memory and a floppy disk drive (no CD), so even if you could fit your office suite on the hard drive, you wouldn't be able to run it. The announcers then try to sweeten the deal by offering "hundreds of dollars worth of software" for about \$80. Prospective buyers can only hope that the no-name applications are themselves old enough to run on such a poorly outfitted system.

Who can possibly be the target audience for these refurbished machines? Only people who don't know any better, unfortunately—people who will see the commercials and think that this is a good way to get into computing.

Andrew Campbell of SeniorLink Mobile Computer Training wrote in to tell about similar concerns with how this deal will affect his clientele: "Our aim is to give the over 50s a good introduction to

computers, and it's heartbreaking to see people spending their money on a machine which could bring them terrible frustration

and cost them a great deal more down the track."

When you consider that many of the potential customers are probably those who want a computer so they can get connected to the Internet and e-mail, it's ironic that it will end up costing them almost what they paid for the deal to do so—and they'll still be stuck with a standard system.

This isn't the first shonky deal that has been offered on television and it certainly won't be the last, but it's especially depressing nonetheless. If keen buyers find they've spent all that money for what amounts to nothing more than a "souped-up typewriter" (as Andrew Campbell calls it), it could very well turn them off from computing completely. And that would be a shame.

There's one truth the lasting popularity of these commercials has shown us: there will always be people who will buy something they don't need and will never use if the price is perceived to be right. The only thing you can do, if someone you know asks about such deal, is tell them (no matter how many operators are waiting): *Don't call now!* ■

A stylized, handwritten signature in black ink, which appears to read "Brian Haverly".

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deal to be
offered on
television, and
it certainly
won't be the
last.*

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Letters

UNREAL EXPECTATIONS

In response to the upgrade section featured in your article "Perfect PC" [*PC Magazine Australia*, September 1998], I think it's important to note that the average computer owner has a two-year-old machine that cost \$2500 to \$3000 (and maybe they're still paying it off). It's a P120 or P150 (MMX if they were lucky) with 16 to 32MB RAM and either an S3 TRIO or ET4000 video card. Now this average person has discovered from your included demos that they can't run *PlaneCrazy* or *Quake2* (let alone *Unreal*). Your solution is to spend another \$2500 on a new P2 with say a *Matrox G200* or an *Intel I740*. The trouble is, where does the new money come from? Not everyone can afford to spend \$2500 every two years on computer hardware—the software is bad enough. So why not promote my solution: go out and spend \$170 on a NEW Diamond Monster with 4MB RAM and all those games you only dreamed about will come to life (my P133 runs *Unreal* quite well).

This will keep you happy for about 12 to 18 months, before you have to buy the replacement for the P2, but will save you \$2300 in the meantime.

So although your article in the September edition on upgrades was welcome, it didn't really help the average user. And I'm sure you component advertisers will be happy to see you promoting upgrades, not just what new system you should buy.

STEPHEN BITMEAD
VIA THE INTERNET

THE PROSECUTION RESTS

I've been subscribing to *PC Magazine Australia* for two years now, and your editorials have breathed fresh life back into the magazine. You strike me as someone who knows his stuff, but also realises that there's more to life than computers. Congrats.

My question, though, is: why can't I sue Microsoft? I know your reviews have quoted Microsoft as saying that they "didn't set out to make significant improvements in general system performance" with Windows 98, but the fact is, they did. They said often and loudly that "it works better and plays better", and *it doesn't*! I would have spent be-

tween 40 and 50 hours in the last month or so trying to get the thing to work at all, and I'm sure my "teething" problems are by no means at an end.

I put in the time partly because I can't afford to pay \$45 to Microsoft every time something goes wrong with their system, and partly because I assume that each time I go through the difficult process of working it out for myself, I'll get a little wiser and be able to tackle the next disaster more easily. But it never seems to work that way. I finally locate the legacy driver that had been causing the printer problems, and then find the video won't work on my

daughter's favourite game. I eventually work out that there is nothing wrong with Quicktime, but that Windows won't automatically change screen resolution any more, but that it works when you alter it

*"They told me that
it would 'work better
and play
better'—and it
doesn't."*

manually. Then my word processor starts generating strange characters across the screen. I start looking for some macro that has inserted itself. I try changing the keyboard. Eventually I find that the keyboard setup has somehow defaulted to using Portuguese language! And so the journey goes on.

Despite the fact that I have a great swag of utility programmes running in the background (from Symantec, Cybermedia and Quarterdeck), I've still encountered numer-

ous critical problems that none of these utilities are of any help with. The last one involved Win 98 not being able to read the right amount of free space on my hard drive. Various utilities attempted to fix it. I eventually tried using backup copies of boot sectors, registry, partition tables, etc.—all to no avail. I've now been forced to reinstall the whole Win 98 beast a third time, and I suspect it won't be the last.

Yes, I should have read your articles first, and not been swallowed up by the advertising hype, but it's easy to be wise after the event. My bottom line is that they told me it would "work better and play better"—and it doesn't, but by the time you've switched to FAT 32 it's too late to take the thing back. Shouldn't I be entitled to some form of compensation for all the wasted time I've poured into my computer because I listened to their false promises?

REVEREND DAVID B. SMITH
VIA THE INTERNET

POINTEDLY PLEASED

On page 4 of this month's [October 98] *PC Magazine Australia*, some smart cookie has decided to put an "image map" of the front cover, and on which pages you can find the associated articles. Two words: bloody brilliant. Give 'em a gold star.

BRUCE WILLIAMS
VIA THE INTERNET

PORN SITES? NEVER HEARD OF THEM

One of the less desirable effects of visiting a porn site on the Web, and handing over a credit card number to get in (if only for a once-only visit) is that at a later date—months perhaps—one finds small

HOW TO CONTACT US

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Letters

debits made to the credit card for, say \$10 US.

Now these debits are tiny and can easily be missed, or glossed over, and for a while I thought that the ones appearing on my statement were from some virus program subscription. Wrong—the clue was that the credit card entry had the initials fl appended to it; Holland, in other words, and hence a porn site subscription. Strange, since I hadn't "subscribed" to anything.

The joy of this "subscription" is not only a monthly debit to one's credit card, but also the dubious distinction of being able to receive lots of junk e-mail from various porn sites.

Then it slowly dawns that this may well be an Internet scam, and a telephone call to the bank, or the credit card company, causes wonderful results. Of course you do have to officially question the debit, which in my case was cancelled and credited. Then a few weeks later, my junk e-mail traffic crawled to a halt! What a pleasure to see that junk email can actually be stopped dead in its tracks.

So to all of you out there who peeked into a porn site, paid the price and receive junk mail, check your credit card statements.

LOUIS HISSINK
VIA THE INTERNET

NOTHING FOR NT

I've been all over the Net looking for an NT software router that can do IP packet filtering and redirection so that we can do packet filtering. The main aim is to implement a transparent proxy with proxy software by a particular vendor who assures me that trans-

parent proxy is about filtering all Web requests from the IP stream and redirecting them to an IP address on the proxy port number.

MARC LUCKE
VIA THE INTERNET

I haven't heard of any such software for NT. I think some newer Cisco routers can do it, but

*"A cheaper solution
[for IP packet filter-
ing] is to get a cheap
Pentium (or a PII)
and load it up with
Linux and Squid.
Linux has the needed
forwarding in the
kernel."*

that could be an expensive option as I think it's only a feature on their higher-end boxes.

A cheaper solution (provided you're not hell-bent on being an NT-only shop) is to get a cheap Pentium (or a PII) and load it up with Linux and Squid. Linux has the needed forwarding in the kernel. Even if you had to pay somebody to set up the box you'd probably come out ahead, as all the software itself is free.

I have no doubt that somebody will release an NT product eventually, but as I said, I haven't heard of one yet.

—Mark Cheeseman
Manager, ZDNet Australia and Gamespot Australia

TOO MANY FILES

I bought your magazine [October 1998] for the first time because your CD-ROM had printed on its label "Microsoft IE 4 Service Pack1 (Full) v4.01SP1" which I wished to use on my PC. I can't find the service anywhere on the CD-ROM. Could you please tell me how to access this file?

MARC LUCKE
VIA THE INTERNET

It's file 000EJJ.htm in the 5-star folder on the CD.

—Craig Sharkie
CD Production Editor

CORRECTIONS

• In last month's review of LCD monitors, the photograph for Cybercomp's Visioneer 1500TAP was incorrect. We apologise for the error.

September Competition Winners

In our September issue, we asked readers to describe how they would use the SparQ 1GB Removable Drive if they were to win one of the four on offer from Westan. The responses were serious, fun, very creative—and numerous! So it was a difficult decision, but we managed to come up with the following four winners:

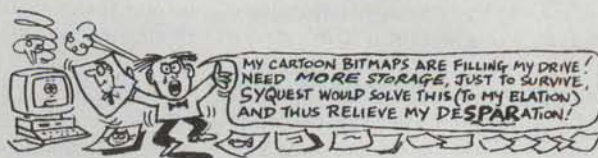
• Arthur McRedmond of Tasmania writes: "I'm a songwriter. What a superb tool to store all my songs in one place, on one cartridge. Sparq is music to my ears."

• Drag Popec of Victoria wanted to use the 1GB removable drive to create a compilation of his son's growing up by storing video clips, photos and scans of his work and development.

• Enterprising Russ Jason Webber of Western Australia figured

that he could earn pocket money by using the SparQ to back up all his friends' hard drives and his Dad's computer.

• And finally, the winning submission from Al Bengé of Queensland can only be reproduced visually:



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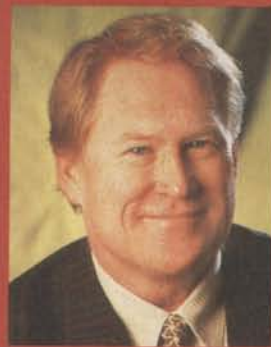
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New and Unimproved

There are a number of technologies around the corner that will be incorporated into the PC—whether we want them

or not. Many of them will add functionality we don't need and won't use. Despite the illogic of some of these ideas, the makers persist for the simple reason that none of them know what they're doing. Here is how the mechanism works. (Cut out and save.)

A venture capitalist meets a screwed-up inventor who is strung out on cocaine. The venture capitalist is then sold on an idea that's simply ludicrous: let's say, to make a video monitor that also keeps hamburgers and french fries warm—a kind of built-in bun warmer. The capitalist invests money, helps build a company with a cool name, then goes to the same-old same-old conferences and pitches the product to the clueless attendees. If the presentation is good, they all get jazzed and talk about it over lunch: "Someday all monitors will have built-in hamburger warming."

The media, which is there looking for a story, picks up on the buzz and reports it.

SYDNEY, August 14—The Trends in Computing XI conference ended here today, with all the talk being about new LCD panels, PalmPilot software and monitors that double as hamburger warmers. The last is expected to be a big trend, according to several analysts in attendance. "There is no question that hamburger warming is the future when it comes to monitor design," said Mark Donohue, lead investor for Cornwall Ventures. Other observers agreed . . .

Because this idiotic device was reported on and, frankly, because it was odd and interesting, all the computer magazines cover it. Then the columnists get into the act. A few pundits say it's stupid, but most (who seem to be in awe of the venture capitalists) go on and on about what a wonderful idea built-in hamburger warming is, and why hasn't someone thought of it before? "It's a good use for all the wasted energy a monitor expends."

Monitor makers, all panicked by the possibility that they'll be out of business overnight if this is indeed a trend (however dumb it may seem), each make announcements concerning the development. Some companies preannounce the hamburger-warming monitor while actually doing nothing but waiting to see whether others are successful. Others announce: "More research needs to be done in this area. It's not a trivial undertaking, and our company does not want to produce a prod-

uct that isn't the best in its category." They also do nothing but wait. The venture-funded company goes ahead with the

product and claims to be the leader in the category. A few panicky Taiwanese companies blindly follow suit, hoping to make names for themselves.

The media reports all this as news, which it is. Enough reporting is done that the shareholders of the wait-and-see monitor companies begin to question the judgment of the CEOs for "not moving faster in what appears to be a major trend." The media reports on this, too, thus frightening all the CEOs of all the monitor companies. The buzz is really going now.

The venture-capital-funded monitor company gets a good PR agency, which dreams up some numbers showing how important this development is. To kill time, surveys are conducted of the readers of the magazines that have been pumping the new monitor. "Do you plan or does your company plan to purchase a hamburger-warming monitor (a) immediately, (b) within six months, (c) within a year, or (d) no plans?" Not wanting to look like dummies who are out of touch with trends—especially trends they read about in their favourite publications—all the respondents choose a or b, when in fact they have no idea whether they're really going to purchase the product, ever!

One or two large companies, under pressure from shareholders, announce plans to convert completely to hamburger-warming monitors. The media reports this plan, along with the survey results that say 94 percent of all those surveyed will switch to hamburger-warming monitors within the next six months. The reports freak out all the monitor makers, other CEOs who thought the product was stupid, research companies that didn't see the trend and magazines that didn't give it enough ink. Network TV, the last guys to find out about anything, jump all over it. Pretty soon hamburger-warming monitors are all anyone can talk about.

The monitors hit the market with a big thud and nobody buys them. All sorts of weird reasons for the failure emerge, mostly like "they were ahead of their time" or "they weren't executed properly", whatever that means. Meanwhile, we're off chasing the next big thing. Sound familiar? ■

"Someday all monitors will have built in hamburger warming."



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Navigating the Shoals of PDAs

No one really needs a personal digital assistant (PDA); if you're happy with your paper-and-pencil appointment book

and note taker, stay with it. And deciding which PDA is right for you is a matter of working style and expectations, not specs. I can no more prescribe the right PDA for you without knowing what you need and how you work than I can find you the right job or car. But I can tell you what I think about today's crop of new PDAs and which way I think the market is going.

I've been a 3Com PalmPilot fan since the PDA appeared three years ago. Palm Computing turned the corner with the PalmPilot and wants to lock up market share with the new, top-of-the-line Palm III. 3Com understands what previous pocket computer makers didn't: we don't need or want everything under the sun in our pocket rockets, just a few basic functions—our contact list and schedule and a way to take notes. Simplicity, small size, and low weight are what we're looking for.

The Palm III meets those needs. But for many Palm users, it is also a disappointment: it doesn't go far enough. With awful timing, Palm opened the way for another viable hand-held computing standard: the new Windows CE 2.0 hand-helds.

I've been using a Palm III since it appeared, and that experience confirms my initial reaction: if you're a long-time Palm user, the Palm III is a logical if not quite essential upgrade. The larger and bolder typeface option, backlighting and additional memory are worthwhile improvements. But the Palm III doesn't go far enough in expanding the functionality of the Palm platform. Think of it as the Palm II.5.

Palm has thousands of third-party developers, and they do some incredibly clever things. But Palm isn't advancing the state of the underlying platform quickly enough. Indeed, among many Palm fanatics there's a strong sense that Palm must bring out another new machine shortly, both to satisfy existing Palm users' expectations and to fend off the Win CE 2.0 machines.

What's so appealing about the Win CE machines? The Win CE 1.0 hand-helds were jokes, but we're going to have to stop dissing Win CE. Take a look at the Casio Cassiopeia E-10, the best of the new breed. It's almost exactly the size and weight of the Palm III. But its display is contrastier, crisper and easier to read, and the backlighting is far better.

Casio has a slightly better and easier-to-learn Jot-like handwriting recognition engine. Displays in the Win

CE mini-apps are better organised; the appointments-and-tasks display is a model of clarity. The Cassiopeia synchronises easily and reliably with a variety of desktop schedulers. And it has the single feature most obviously missing from the Palm III: voice recording, for quick notes.

As much as I like the Cassiopeia, it isn't the only good choice. Here's where we get into personal style: exactly why do you want a PDA?

What do you want to do with it? Will you carry it all the time or only occasionally?

If all you want is a contact list or contacts plus some appointments, look at Franklin's Rolodex Electronics REX PC Companion. This is a PDA anyone could love. The size of a credit card, it's easy to carry all the time. Its contrasty but nonbacklit, 160 x 98-pixel display can't show much, but with some thought about your entries, that needn't be a problem.

I find keeping up with my appointments requires more screen real estate than any PDA offers. I need quick views of the month or two ahead, as well as weekly and daily details, so I stick with the Ecco Pro (RIP) on the desktop and carry Ecco monthly and weekly schedule printouts. Add a shirt-pocketable REX and I've also got my 2630-entry contact list, too.

If you like the way you keep your schedule now but want a portable, easily editable contact list, the REX is for you. Just make sure you note changes to your REX-based contact list somewhere; you can't enter changes directly into the REX (it lacks an input device) but must instead do so on the PC that runs its full-scale contact manager (like ACT or Microsoft Outlook), then synchronise: a quick, no-brainer job. The upcoming REX Pro will allow rather clumsy direct entry with its SyperKey Light Data Entry System.

Which one's right for you? If you're already in the Palm camp, the Win CE 2.0 machines probably won't interest you; if you're not yet a pocket computer user, I can promise they will. If you're a minimalist, you'll love the REX. ■

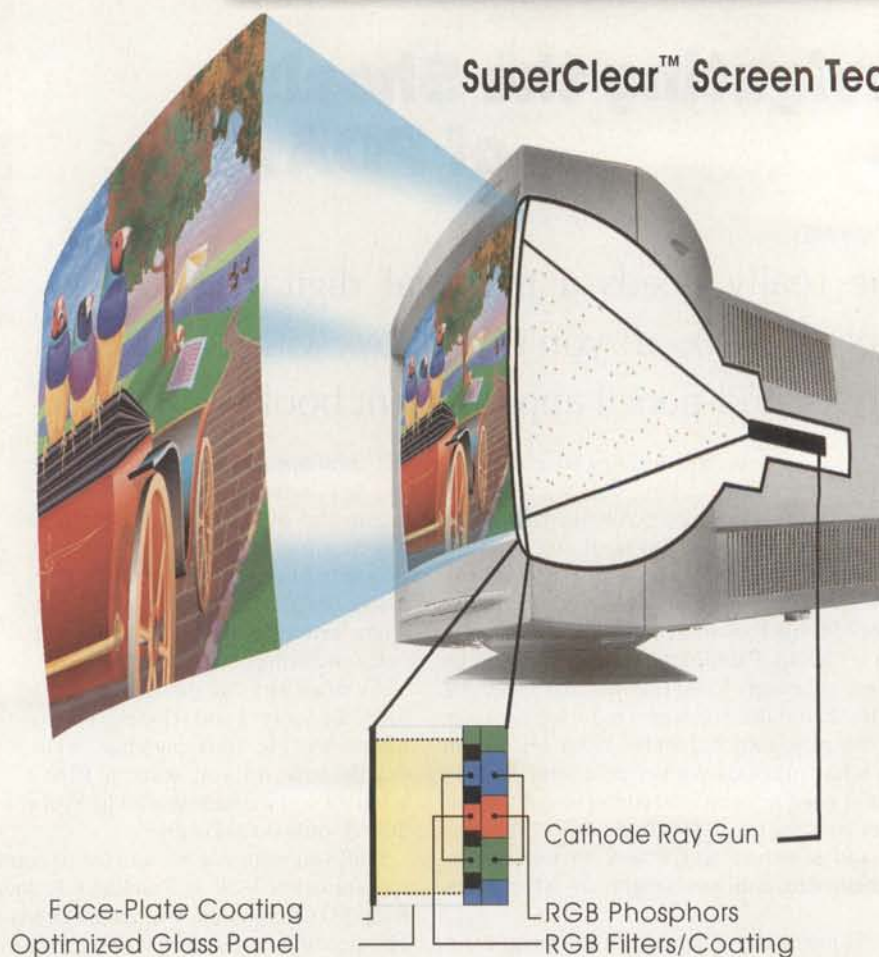
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Applied Technology	---	SuperClear™	SuperClear™	SuperClear™	SuperClear™	SuperClear™	SuperClear™
Dot Pitch	0.27mm	0.27mm	0.26mm	0.25mm	0.27mm	0.25mm	0.25mm
Max. Resolution	1280x1024	1280x1024	1280x1024	1600x1200	1280x1024	1600x1200	1800x1440
Recommended Resolution	1024x768@ 87Hz	1024x768@ 87Hz	1024x768@ 87Hz	1280x1024@ 88Hz	1024x768@ 87Hz	1600x1200@ 76Hz	1800x1440@ 76Hz
Horizontal Frequency(kHz)	30~70	30~70	30~70	30~92	30~70	30~95	30~115



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Why Thin Won't Win (For a While at Least)

The thin-client wars have been raging for years, incited by Larry Ellison's network computer (NC) vision. On one side

stands Microsoft, the champion of general-purpose, high-powered desktop computing. In this world, clients are "fat" so they can do most of the processing locally. On the other side are the networking computing advocates—Oracle, Sun, Corel, Wyse, Citrix and others. In that world, clients are thin and servers are fat, since most of the processing is done on the server. Caught in between are corporate users, who want the flexibility and familiarity of PCs plus the manageability and lower costs of thin clients.

Ironically, although we're moving toward a thinner world, PCs will dominate corporate desktops over the next few years. Here's why.

First, PCs are so cheap that it's less expensive to buy a "fat" PC than a special-purpose thin client. PCs are built by the millions, leading to enormous economies of scale and low, low prices. By contrast, NCs are still built in small batches, leading to higher prices.

Second, the chief benefit of thin clients is centralised administration. Firms can update software once on the server, rather than a thousand times on a thousand individual machines. But thanks to PC initiatives such as WEBM and Microsoft's Zero Administration Kit, you can now get many of these benefits on ordinary PCs.

Then there's the issue of flexibility. Thin clients with sealed cases have fewer parts that can fail and no floppy disk on which employees can upload or download programs or data. But those benefits come at a cost: many NCs can't run the e-mail, word processing and spreadsheet apps that are common across the company. PCs, of course, can do everything a thin client can do, running apps from the server or acting as terminals. But they can also run

productivity suites, custom apps, you name it.

Then there's the fact that Microsoft doesn't like multi-user computing. The company makes money selling one licence for every desktop and doesn't want to see the day when it sells one licence for dozens of desktops. At one point, Microsoft tried to destroy Citrix and its multiuser NT product. When that didn't work, the company made a partnership but took its time releasing Windows Terminal Server. When it finally did, it insisted that buyers purchase a full Windows desktop licence for every client—thereby eliminating most of the cost advantage.

Two other trends will make fat clients attractive in the future. In the mid term, the move to NT on the desktop will benefit companies that chose more-robust PCs. "Lightweight" devices just won't have the power to run NT.

In the long term, we're only two or three years away from breakthroughs in voice recognition, natural-language processing, handwriting recognition and visual recognition. As these technologies catch on, they'll require more-powerful computers. Again, lightweight machines will be left out.

Thin will continue to be in vogue for the short term. But the smartest strategy is to slim down using software—centralised administration, centralised software updating, browser-based apps. Be careful of buying underpowered hardware as a way to save money.

Sealed-case thin clients won't save you much (if anything) in the short term. And they could put up roadblocks to future growth. ■

Over the next few years, the corporate scene will be dominated by general-purpose PCs that are slimmer and much more manageable.



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Intel: Tanner on Tap

Details emerge on Intel's next high-end chip, due this winter.

Everyone wants to know about Tanner. Is it a beachgoer seeking sun or an antiquated British term for sixpence? Is it a craftsman who treats leather or a future Intel processor? It's all of the above—which, among PC users, leads to numerous follow-up questions. Will the chip resemble Xeon (Intel's current workstation and server chip, based on the Pentium II) or Merced (the 64-bit RISC-like chip due in the year 2000)? Will it plug into Slot 2 or Slot M? Will it arrive this year or next?

Though there's been much confusion concerning the processor's likely design, Intel recently disclosed that Tanner, due in the first quarter of 1999, is essentially a Xeon processor equipped with a new set of 3D graphics instructions—the same instructions that will be used in the company's upcoming Katmai desktop processor.

In the spring of this year, rumours were circulating that Tanner was a chip meant to ease the transition from Xeon, which uses the new Slot 2 connector, to Merced, which will use the upcoming Slot M connector. As rumour had it, the processor would be based on the basic 32-bit architecture of the Pentium II yet use a Merced connector, allowing customers to purchase Slot M motherboards well before Merced arrives and then upgrade to the 64-bit chip in the future. Though the Tanner code name was once, in all likelihood, attached to such a project, Intel now says that Tanner will offer a very different design.

As it stands, Intel offers the Pentium II for desktop machines

and Xeon for workstations and servers. Whereas the Pentium II—using Slot 1—houses a 512KB secondary cache that runs at half the processor's clock speed, Xeon can accommodate much larger caches that run clock-for-clock with the processor. Thus, when handling the

In the first quarter of next year, Intel will replace the Pentium II—at least at the high end—with a chip code-named Katmai. This Slot 1 CPU will have the same core architecture as the Pentium II but will incorporate what Intel is calling Katmai New Instructions—a set of

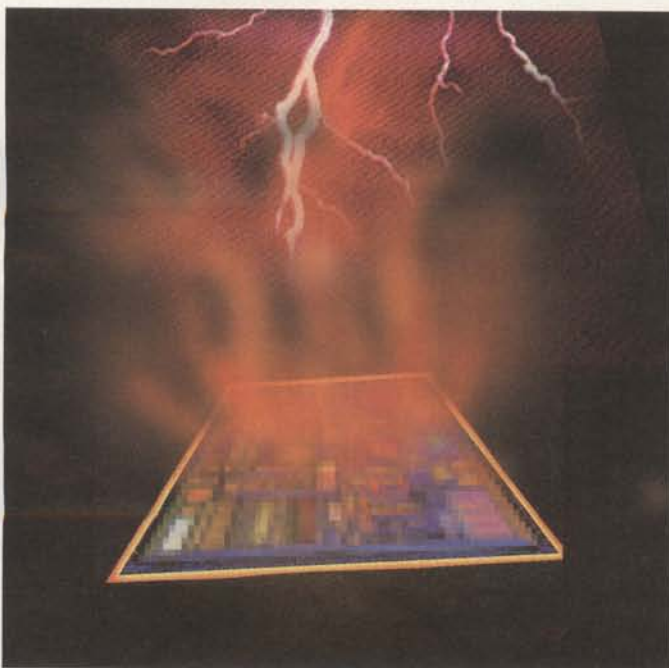
with 3D rendering and other floating-point operations.

As Intel has now disclosed, Tanner will be, in essence, a Xeon processor augmented with Katmai New Instructions. Like the Katmai desktop chip, it will arrive in the first quarter of 1999, will use a 512KB secondary cache, and will initially run at 500MHz. In all likelihood, it will plug into Slot 2, interface with its L2 cache at full speed, and eventually offer much larger secondary caches. Also likely to use Xeon's 450NX chip set, it should be an option for four-way servers equipped with memory subsystems as large as 2GB to 4GB. Any additional information about Tanner is still forthcoming.

Following Tanner by at least a year will be Merced, a RISC-like chip based on the IA-64 architecture originally developed by Hewlett-Packard and Intel. In addition to running a new brand of 64-bit software, it will natively run IA-32 code (used by the Pentium and Pentium II families) and PA-RISC software (used by Hewlett-Packard's proprietary PA-RISC chip). IA-64 will initially be used on workstations and servers but should eventually become the industry's de facto standard platform.

Tanner's repositioning brings up yet another question: will Intel offer another processor with another code name as a transition from IA-32 to IA-64 architectures? Doubtless, the answer to that is no. Since Merced will run IA-32 software on its own, without software emulation or additional hardware, a transition processor unnecessary.

—Cade Metz



massive data sets that workstation and server chips typically handle, Xeon processors—available with 512KB, 1MB and soon 2MB caches—perform much faster than their desktop siblings.

70 instructions that, much like MMX Technology, are designed to enhance multimedia applications. Yet unlike MMX Technology, which is limited to integer-based calculations, Katmai New Instructions will deal primarily

Choose Your Cache: Half-Speed or Full-Speed

A Pentium II or Katmai processor houses a 512K secondary cache that runs at half the processor's clock speed. A Xeon or Tanner processor accommodates a much larger cache, which runs clock for clock with the processor and handles massive data sets.



SCANNERS

Scanners To Fit Your Need

Today, more and more people are choosing to spice up their documents with images they have collected and edited themselves, and it's not hard to see why. Photo-editing packages are becoming easier to use, and the price of digital cameras and great quality scanners is plunging.

Two well respected names in the imaging market, Hewlett-Packard (13 13 47, www.hp.com.au) and Canon (1800 021 167, www.canon.com.au) have recently released new scanners for the home and office markets.

A new Patented technology drives Canon's latest consumer scanners. The **Canoscan FB3200P** and the **Canoscan FB6200P** scanners feature LED InDirect Exposure (LIDE) and Contact Image Sensor (CIS) technologies for less distortion and greater resolution. The new technologies also allow Canon

to make the scanners more compact in size, with both scanners measuring 256 x 372 x 63mm in size and weighing on 2kg.

The FB320P offers a true optical resolution of 300 x 300dpi and is priced at \$229, the FB620P has a true optical resolution of 600 x 600dpi and is priced

THE PERFECT SCAN: Hewlett-Packard (above), Canon (below) and Ricoh (right).



at \$299. iPhoto Express image editing software and Caere OmniPage LE comes bundled with the scanners.

Also aimed at the consumer market, Hewlett-Packard's new **ScanJet 4100C**.

Priced at \$299, the 4100C offers USB connectivity and a push-button colour-copy option in a 600dpi scanner. It also comes with Adobe's PhotoDeluxe Image Editor software.

Also from HP, an offering for the higher end. The **ScanJet 6200C** (\$799) and **ScanJet 6250C**

(\$999) scanners both offer resolutions of 1200dpi and are pitched at professional scanner users. The scanners feature 35mm slide adaptors, and USB and SCSI capability. An automatic document feeder handling up to 25 pages at a time comes standard with the 6250C, and is available as an option on the 6200C.

For a scanner with a difference, take a look at Ricoh Office Automation's (02 9938 0800, www.ricoh.com) **Aficio FX10**, a

multi-function business machine that integrates the features of a digital photocopier, laser fax, laser printer and scanner.

The FX10 produces 400dpi photocopies at 10 copies per minute, with laser prints also produced at the same rate. A document being scanned can be faxed directly, without a photocopy being produced first. The machine also comes with OCR software. The Aficio FX10 sells for approximately \$3000. —Anna Raciti



Dell's Data Vault

Direct vendor Dell Computer is making its entrance into the high-volume storage market with the **Dell PowerVault 650F**, the first enterprise storage system based fully on Fibre Channel RAID technology. Prices start at around \$38,000 for fully configured systems.

The PowerVault 650F incorporates the latest enterprise technologies, including Pentium II Xeon chips, PCI hot-swap capability and Fibre Channel storage. The rack-

mountable system will include dual-ported Fibre Channel disks, taking advantage of Fibre Channel's high data transmission rate of 1GB per second. Dell lets you configure the Power Vault with up to 120 disks, giving it a storage capacity of over 2 TB. A single Dell server will be able to access up to three PowerVault systems, for a total of over 6TB of storage on one server. Also



included are redundant RAID controllers, power supplies, power cords and fans. —Carol Mangis

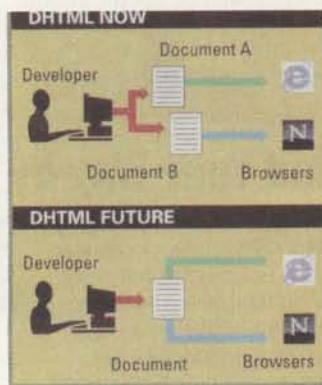
BROWSERS

Netscape Sneak Peek

During a recent briefing, Netscape officials demonstrated a new HTML layout engine for Navigator, designed to meet key new Web standards and to break up browser functionality into embeddable components. The move could largely spell the end of

incompatible implementations of advanced Web technologies, such as Dynamic HTML (DHTML).

The browser's layout engine is the element that takes HTML and associated code describing a Web page's appearance and renders what the user sees. The layout



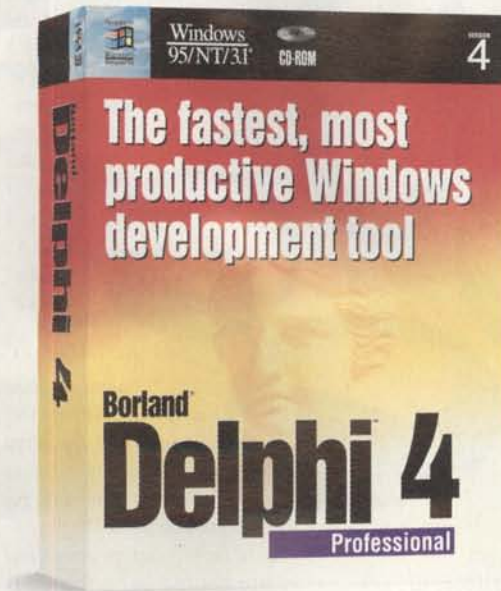
engines in current versions of Microsoft Internet Explorer and Netscape Navigator are largely incompatible when presenting features beyond vanilla HTML elements such as text blocks and images. So most Web developers have eschewed using more advanced capabilities such as layering, which stacks objects in the browser window.

Netscape has pledged that its new layout engine will be compliant with the Document Object Model (DOM) specification,

which the World Wide Web Consortium has ratified. Netscape also says the layout engine will support the entire CSS (Cascading Style Sheets) level 1 specification and many CSS level 2 features.

While it will be some time before the new layout engine shows up on your browser, an embeddable engine that complies with key new Web standards promises exciting possibilities for developers and Web surfers alike.

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PERIPHERALS

USB in the Spotlight

With the arrival of Windows 98, the Universal Serial Bus (USB) ports on your PC are finally ready for action. The much-touted chief benefit of USB is the ability to daisy-chain devices together without loss of bandwidth, thus freeing up serial, parallel and PS/2 ports on your PC. And with an add-on hub (whether on your desktop or built into your monitor), you can connect and disconnect devices easily, without having to reach behind your computer.

A smattering of USB peripherals have been released so far but this quarter will see the delivery of more mainstream devices.

Logitech (02 9972 3711, www.logitech.com) has released the **QuickCam Home** PC digital video

camera. Priced at \$299 the USB camera delivers includes a built-in microphone and produces video at up to 30 frames per second as well



USB'S HERE:

Logitech's **USB Wheel Mouse** and **QuickCam Home**, Imation's **SuperDisk** and Epson's **Stylus Color 740**; (clockwise from top).



capturing still images.

Also from Logitech, an am-

bidextrous, three-button scroll-wheel mouse, the **Logitech USB Wheel Mouse** (\$89.95). Because of USB compatibility, the mouse can be plugged and unplugged without rebooting the computer.

Imation (1800 225 013, www.superdisk.com) is selling a \$379 USB version of its 120MB **Imation SuperDisk** drive for the Macintosh environment, and a PC-compatible version will be available by the

time you read this. Meanwhile,

Imation (02 9955 2455, www.imation.com) is readying the

Imation USB Zip Drive for release by the end of this year. It will be priced around \$350.

Not to be left out, printer vendors are getting in on the USB

act. Epson (02 9903 9000, www.epson.com.au) has unveiled the **USB Epson Stylus Color 740**, which sells for \$599. The four-colour ink jet printer has a maximum resolution of 1440 x 720 dots per inch (see this month's comparison of inkjet printers). The unit supports a variety of media, including transparencies and iron-ons, and is compatible with both PCs and Macs. Epson offers a one-year warranty with the printer.

What can we expect in the near future? Already companies are finding innovative new uses for USB ports. STMicroelectronics (02 9580 3811, www.st.com) has announced a 56kbps modem chipset that plugs directly into your computer's USB port. The tiny **Pegasus** chipset is housed in a compact "dongle". Used in conjunction with Smart Link software, the modem will utilise some of the CPU's own processing power to operate. —Anna Raciti and Josh Levy

GRAPHICS CARDS

Graphics Cards: One-Upping the One-Uppers

Round three in the fight to control your PC graphics has begun, as chip and board makers trot out the third generation of 2D/3D graphics accelerators to woo PC vendors and retail buyers. The game of one-upmanship continues with better, faster 3D.

The other big news: memory is so cheap (and the demands of 3D so great) that many makers are forgoing 4MB versions of their boards—the typical configuration for mainstream PCs in the past year—and delivering 8MB cards for the former 4MB prices. At under \$500, even 16MB cards are now relatively affordable. There are also fancy new 3D-graphics effects, including bump mapping, where textures can take on 3D effects of their own, such as the rough surface of a brick wall; and anisotropic filtering, which cuts down on distortion when textures are applied to tilted surfaces.

The new **Hercules Terminator**

Beast card (Peripheral Sources International, 03 9878 8611, www.hercules.com) uses S3's Savage3D integrated 2D/3D graphics chip. Targeted at power users of both Windows productivity applications and graphics-intensive games, the 8MB AGP iteration should sell for around \$269.

STB Systems (Alfa Computers, 02 9317 3344, www.stb.com) is also releasing its **STB Nitro 3200**, which is based on the Savage3D. Pricing had not been set at press time, but like Hercules, STB is skipping the 4MB memory plateau and going right to an 8MB version. This AGP card features a 250MHz RAMDAC and TV-out support so you can view the computer image on a TV monitor.



RACE TO THE FINISH: Number Nine's new 2D/3D accelerator.

Another chip arrival is the RIVA TNT from nVidia. The company's previous generation, the RIVA 128, delivered one of the fastest 3D performances of any integrated 2D/3D

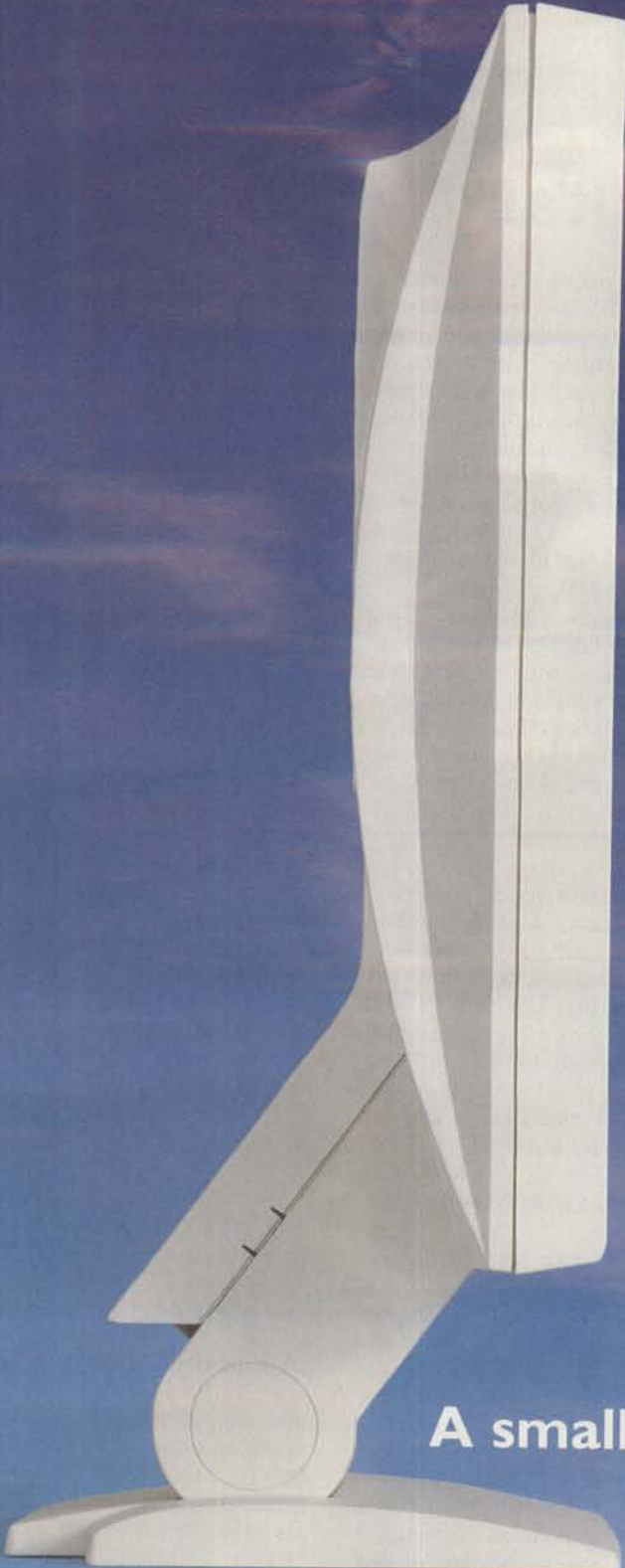
solution when we last looked at graphics cards. Diamond Multimedia offers the TNT-based **Diamond Viper V550**, which is available in

both AGP and PCI versions (Chips and Bits, 03 9696 1911, www.diamondmm.com). Diamond is skipping 4MB and even 8MB with this offering; the 16MB version will be about \$499—less than the typical price of an 8MB board a year ago.

Number Nine Visual Technology (Focal Point Computing, 03 9525 1144, www.nine.com) plans

to have its fourth-generation 2D/3D accelerator in stores in the third quarter, and its price is even more impressive. The 16MB **Number Nine Revolution IV**, based on the company's own Ticket to Ride IV chip, will sell for \$470. For the real thrill seekers, a 32MB version is also available; it sells for \$620.

Another new chip set hitting the streets before year's end is the second-generation **PowerVR** chip from NEC Electronics and VideoLogic (www.powervr.com). The PowerVR technology is being used in Sega's game consoles in the consumer electronics space, and the company is bringing a family of new chips using the latest tricks to the PC arena. The company expects major board makers to use the chips on cards aimed at PC gamers and the retail upgrade market in early 1999. See this month's graphics card feature for graphics cards test results. —Jamie M. Bsates



A giant step for mankind.

A small footprint for your desktop.



This new PanaFlat LC40 is a MultiScan colour TFT LCD Monitor, and it's part of Panasonic's new range of computer monitors. It's a range which gives you a choice between this LCD and CRT monitors in four screen sizes: 15", 17", 19" and 21". The new SL range of 17" and 19" CRT monitors are 20% shallower than any other CRT monitor, so their footprint is far, far smaller. And because the PanaFlat LC40 has a depth of only 149mm, its tiny footprint gives you a much bigger desk.

The PanaFlat LC40 is state-of-the-art, it has full screen display at all resolutions, it's plug-in compatible with CRT monitors.

For more information please contact Customer Care on 132 600.

What's New
by
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DVD

Clearer Pictures, Better Sound: It's DVD

If you thought DVD was still years away, think again. Hardware and software vendors banded together recently to officially launch DVD players and DVD content to the public. Although limited numbers of DVD movies have been available for almost a year, the launch was organised to demonstrate how mature the DVD market has become over the past few months and to kick-start mass market interest in the digital video format.

All the major players producing DVD hardware and DVD movie content were represented including Yamaha, Pioneer, Creative Pacific, Warner Home

Video, Warner music, Roadshow Entertainment, Columbia Tristar, RCA, Onkyo and others.

Perhaps the most exciting



news to emerge from the launch was that many video companies have decided on concurrent release dates for both DVD and video tape versions of new re-

leases.

Content providers announced initial DVD video releases of around 20 movies and music video titles (both new release stock and back-catalogue stock), with around 10 new titles to be released per month. DVD movies should sell in retail stores for between \$29.95 and \$35 each. DVD players should sell for between \$1000 and \$3000.

For those more interested in renting DVD content, companies announced their DVD movies should be available for rental through Video Ezy, Blockbuster and other major video rental chains by November.

—Anna Raciti

CD RECORDABLE

Faster Recordable CD

Recordable DVD solutions, such as DVD-RAM and DVD+RW, may (still) be just around the corner, but for many users, recordable CD drives remain a better option. Even though the capacity of recordable DVD—2.6GB and up—is spectacular, the first generation drives won't allow you to create CD disks that you can distribute for use in any CD-ROM or DVD-ROM drive. A 650MB compact disk—recordable (CD-R) or compact disk—rewritable (CD-RW) drive, on the other hand, creates disks that can be read by most any CD-ROM, DVD-ROM, or audio CD player.

Smart and Friendly (Verbatim, 03 9823 0999, www.verbatim.com.au) is the first out with a CD-R burner that writes disks at an impressive 8X speed—that's just 9 minutes for a full CD. The **Smart and Friendly CD Rocket** (internal, \$2249, external \$2495) reads CDs at 20X, and the software bundle includes the usual CD mastering software, as well as Sonic Foundry's Sound

Forge for building professional-quality sound tracks and music.

From Ricoh (Protac, 02 9637 8999, www.protac.com.au) comes the **MP7040A CD-RW drive**. Priced at just \$999, the Ricoh is easy to install and use, while offering speeds of 20X read, 4X record and 4X rewrite. The drive features 2MB data buffer memory and comes with ClipDisc packet writing software and Adaptec's Easy-CD Creator software.



RECORDING

FRENZY: Smart and Friendly, Micro Solutions and Hewlett-Packard (clockwise from top).

For mobile users, Micro Solutions is offering two new portable CD-RW drives in its line of **Micro Solutions backpack cd-rewriters** (Advanced Pacific Peripherals, 02 9557 8111, www.micro-solutions.com). Each 1.9kg drive can connect easily to your laptop's

parallel port, and the 650MB capacity makes each one ideal for storing and transporting large presentation files, e-mail archives, and the like. As with all CD-RW drives, you can create read-once CD-R media to share with CD-ROM users, use the rewritable CD-RW media for backup and archiving, and read CD-ROM disks. The 4X CD-R/2X CD-RW/6X CD-ROM version sells for \$995.

New from Hewlett-Packard (13 13 47, www.hp.com.au) is the **HP SureStore CD-Writer Plus 8000i**, an internal IDE drive that reads data at 24X and writes at 4X. One of the drives most innovative features is a feature called

HP fast format, a technology which allows the disk to be partially formatted in 5 minutes, allowing the user to then use the disk while the rest of it is formatted. This cuts down much of the time usually wasted while a disk is being formatted. The 8000i includes Adaptec's Direct CD, Easy CD Audio, Easy CD Creator and Disk Labeling software as well as HP SimpleTrax and Disaster Recovery software. The SureStore 8000i is priced at \$899.

—Anna Raciti and Jamie M. Bsales

PRICE CUTS

If you're interested in DVD, but have been waiting for hardware prices to drop, check out **Creative Pacific's** (02 9906 8887, www.cppl.com.au) PC-DVD Encore. It's dropped in price to \$549.

High-end consumer **Canon** (1800 021 167, www.canon.com.au) bubble-jet printers, the seven-colour BJC-7000 bubble jet and the A3-sized BJC-4650 have dropped in price from \$729 to \$499 (for the 7000) and from \$599 to \$499 (for the 4650).

3Com's (02 9937 5000, www.3com.com.au) US Robotics 56K V.90 external Voice Faxmodem has dropped from \$259 to \$249, the US Robotics 56K v.90 External Faxmodem has dropped from \$229 to \$209.

The Price of **Compaq** (1300 368 369, www.compaq.com.au) AlphaServers has been reduced by up to 12 percent. The reductions apply to the AlphaServer 8000, 2100 and 4100 range, all powered by the Alpha 21264 processor.

Looking for a bargain when it comes to graphics cards? **Innovision** (1300 785 795, www.canopus.com) has reduced the price on the popular **Canopus Pure 3D II** and **Pure 3D II LX** cards. The Pure 3D II drops from \$649 to \$599, the LX version from \$599 to \$499. Both cards come with 12MB RAM and are based on the Voodoo 2 chipset. The Pure 3D II card also comes with TV out and on-board fan.

SalesLogix (03 9876 3192, www.saleslogix.com), producer of sales and support automation software, will now include SupportLogix add-on products (costing up to \$16,000) free with the \$12,995 five-user starter pack.

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Henry Kloss, with raps from PC Magazine - "the
only speakers you'll ever need" and Boot Magazine
- "as serious as they come".

Then there's the 3D Blaster™ Voodoo2™ -
the fastest 3D game accelerator ever created for
the PC - unless you choose two Voodoo2 cards -
then you get an almost absurd effective fill rate of
360 million texels per second.

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NETWORK MAPPING

Diagram Your Network

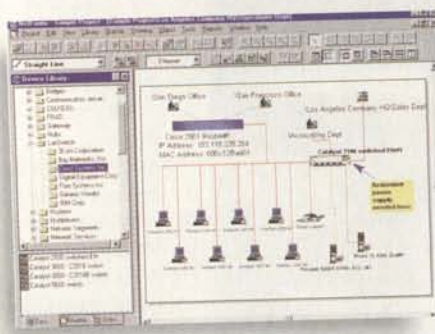
Getting a handle on your steadily growing LAN can be a huge task, especially when contending with the time-consuming chore of tracking all of your equipment. Two companies have new products that help you physically map out your network.

Micrografx (1800 644 298, www.micrografx.com) now offers two products for network organisation: **NetworkCharter** and **NetworkCharter Pro**. (\$595, and \$1880, respectively). NetworkCharter's Discovery function locates all of the devices on your LAN and charts them in a graph or table. NetworkCharter can locate up to 150 devices; for finding an unlimited number of devices, you'll have to upgrade to NetworkCharter Pro, which finds all devices sitting behind a router segment.

Once charted, you can see a graphical representation of your entire network, making new

hardware and connections much easier to add. If you're setting up a new LAN, design wizards guide you through the complex process and check your information against the library rules and specifications. Flexible documentation features let you customise reports using an extensive library, containing specifications for over 5,000 devices and components in NetworkCharter and over 10,000 in NetworkCharter Pro. To receive the latest updates, a maintenance subscription option is available.

Long-time player Visio (02



PICTURE PERFECT: Micrografx NetworkCharter locates and charts network devices.

9929 2399, www.visio.com) has added a new level of functional-

GPS Tracks You Down

New horizons are opening up for GPS (global positioning system) technology, following the announcement by US-based Sirf Technology that it has developed a tiny GPS chip set that fits inside a cellular phone. Ericsson and Nokia have announced plans to use the chip set in their upcoming cellular phones, and Acer and Umax plan to use it in upcoming consumer electronics devices.

Current GPS devices, such as the receivers that plug into notebook computers, work by communicating with satellites to pinpoint the location of the receiver on a map. But devices

smaller than notebook computers haven't seen much adoption of GPS, since considerable power is required to receive the satellite signals. Sirf's inexpensive chip set fits into a cellular phone or hand-held computer and is powerful enough to receive satellite signals.

Sirf's founder, Kanwar Chadha, says that many applications can be built around GPS once it shows up in cellular phones and hand-held computers. For instance, a GPS-enabled sales database would be able to sort information according to a salesperson's precise location.

ity to its Visio Professional 5.0 diagramming package with the **Visio Solution Pack for Novell Directory Services (NDS)**. The Solution Pack is the first and only low-cost, drag-and-drop diagramming tool available for Novell directory structures. The Pack is a free download from the Visio Web site but requires that Visio Professional 5.0 (\$599) already be installed.

Included in the pack are over 40 SmartShapes objects that correspond to the container and leaf objects found in NDS. Each

shape contains the attributes—such as log-on name and network address—that are necessary to create new NDS objects.

The Pack can both read from and write to your NDS database, saving any changes you make in Visio back to your NDS structure. It's also able to graph the entire NDS tree, which means you can create an organisational view of an NDS structure that includes relationships between peer devices not viewable in a horizontal tree view. —Adam Asch

56K COMBO CARDS

Combine Your Needs With a Combo Card

New developments provide even more benefits. The use of 32-bit CardBus technology lets the PC Card do its own processing and sidestep the laptop's CPU. This results in faster performance and removes a speed bottleneck when using an

Ethernet connection. ISDN connectivity is also becoming more widely available, which means you can take advantage of

fast connections while on the move.

So far, the new V.90 56.6kbps standard remains a flash upgrade option; the three products below adhere to the K56flex standard.

Ositech's **Jack of Spades** (\$848) is among the first PC combo cards to im-

plement the new 32-bit CardBus technology (Advanced Portable Technologies, 02 9433 8300, www.ositech.com). In addition to the faster interface, the Jack of Spades includes a 56.6kbps modem, a 10/100 Fast Ethernet network connector, and Ositech's Digital Phone Interface (DPI) technology. With DPI, you can use one RJ-9 handset adaptor to connect to nearly any phone in the world, relieving the burden of having to lug around a separate adaptor for each country you visit.

Psion Dacom (BlueChip NZ +64 4 801 9595, www.psiondacom.com), one of the first compa-

nies to release a four-function PC Card, uses the 32-bit CardBus to push performance up a notch on the **Psion Dacom Gold Card NetGlobal** (\$765). The NetGlobal packs a 56.6kbps modem, a 10Mbps Ethernet port, PCS/GSM cellular phone connectivity, and are ISDN-ready—all on a single PC Card.

Similarly, and due out by the end of the year is Simple Technology's (Westgroup, 02 6280 4439, www.simpletech.com) **56K Global Communicator**. The Global Communicator will include a flash-upgradable 56.6kbps modem, GSM cellular support, a 10/100 Ethernet port and ISDN connectivity support on a single PC card. —Michael N. Rusignuolo



PLUG AND SURF: Three multi-function PC Card modems.

Annual Report 1998

Matrox Graphics Inc. 1998 record sales for 1997-1998 of \$480 million US

Matrox Graphics Inc. today posted record sales of \$480 million US for the 1997-1998 fiscal year — confirming the company's number one position in the highly competitive graphics industry. A major contributor to this success is the Matrox Millennium chip technology that powers the industry standard Matrox Millennium and Millennium High Performance graphics accelerators. Matrox Graphics Inc., designer and manufacturer of graphics and video chips, is a separate division of privately held Matrox Electronic Systems Inc. founded in 1978.

"The relentless efforts by the Matrox engineering team to push the envelope on graphics ASIC development has allowed the company to grow at a phenomenal rate

to become their number one revenue driver in the highly competitive graphics industry," explains Corina Trubner, President and co-founder of Matrox. "The constant profitability of the company has also allowed Matrox to fund its own growth and invest in the development of new products that will set the highest standard in graphics performance at the upcoming millennium."

Exponential growth

1997, Matrox

with its latest

accelerators

Matrox

Graphics Inc.

designer and

manufacturer

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video chips, is a

separate division

of privately held

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1978.

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NETWORK MANAGEMENT

Management's Next Wave

Network management is turning to the Web. The current trend is toward standards-based, end-to-end management solutions accessible through a browser. Yet these products must also integrate with existing enterprise management products such as HP OpenView, CA Unicenter or Tivoli. The ideal of simple, integrated network management software comes closer to reality with new releases from Compaq (1300 368 369, www.compaq.com.au) and Hewlett-Packard (13 13 47, www.hp.com.au).

Compaq aims to provide a single management package that fits organisations of all sizes with its **Insight Manager XE**. The software is the first product available that complies with the Web-Based Enterprise Management (WBEM) standard; all management tasks are handled via any PC on the

network using the Internet Explorer 4.0 browser. Compaq includes Insight Manager XE with all new Compaq servers.

The key to Insight Manager



TRAFFIC LIGHT: Monitor network traffic with HP's TopTools.

XE is its tight integration. It allows you to handle all DMI, SNMP and Web-managed products from a single console, and plugs into existing enterprise management platforms. This means you can manage nearly anything on your network through one interface, whether it's a managed switch or a desktop PC.

Insight Manager XE has two components: Management Services provides auto-discovery of devices, central data archiving, alert setup and administrative authentication. System Manager delivers real-time data on managed systems, event notification and the ability to perform remote management operations.

Hewlett-Packard is expanding its HP TopTools management line with **TopTools for Hubs & Switches**, which comes bundled with all new HP managed hubs and switches. You can use TopTools just for managing network devices or incorporate it with enterprise-wide management packages.

Because TopTools For Hubs & Switches is browser-based, you can monitor your network devices from any PC. The software can monitor traffic on up to 1500 segments simultaneously and can administer any standards-based hubs or switches. TopTools gives you graphical, real-time reporting and alerting on your network devices. There's even a network performance advisor that analyses your network and suggests ways to improve performance. —MNR

GRAB BAG

Since the release of the iMac, Apple has been busy readying more products for sale... Apple's (02 452 8000, www.apple.com.au) high-end Macintosh Server is powered by the PowerPC G3 processor. It runs at 333MHz or 300MHz and features a huge 1MB L2 cache. The system supports up to 768MB SDRAM and multiple Ultra/Wide SCSI disks. A 333MHz model with 128MB SDRAM, two 9GB Ultra/Wide SCSI disks, a 24X CD-ROM and 10/100Base-T card is priced at \$10,495. **Also newly released by Apple...** A PowerBook notebook powered by a 233MHz, 266MHz or 300MHz PowerPC G3 processor. The new PowerBook comes with a 512KB L2 cache, 14in screen, 20X CD-ROM, ATI Rage LT Pro video controller, video out, 56kbps modem, built-in Ethernet, Cardbus support and two hot-swappable expansion bays. The 233MHz model is priced at \$6595. **Mobile computers have been popular this season...** Compaq (1300 368 369, www.compaq.com.au) has just announced three new Armada



notebook product families: the Armada as well as new models of Armada 7800 and 1700 featuring Intel's new 300MHz Pentium II processor. The new 3500 series is made up of thin and light notebooks and features processors up to 300MHz PII and screen sizes up to 13.3 inches. Prices start from \$5995 for a 266MHz model with 12.1 inch screen. The 6500 series offers high-performance with a 300MHz PII processor, 14.1 inch screen and 56kbps modem at \$9495. The 7400 series features magnesium alloy casing for greater durability. Models in this series offer multibays for flexibility, most models weigh in at just over 2.7kg. Prices start at \$7995. **If you like the space saving feature of a mobile, but want the low-cost of a desktop...** Hewlett-Packard (13 13 47, www.hp.com.au) has announced a new line of Brio corporate desktop PCs that are about half the size of a typical desktop tower. The Brio 7000 series starts at \$2499 for a 266MHz model with 32MB RAM, 2.1GB UltraATA hard



drive, Matrox G100 AGP graphics with 2MB VRAM, 16-bit sound card and 10/100Base-T LAN Adaptor. **Looking for peripherals for your PC...** Boston Acoustics's (Hi Fi & Video Marketing, 02 9319 6877, www.bostonacoustics.com) newest speaker set is the MediaTheater; a new multimedia

sound system featuring Virtual Dolby Surround. The MediaTheater consists of two magnetically-shielded satellite speakers and a sub-woofer to five a five speaker-type sound using only the two speakers. Priced at \$599 the speakers feature Dolby ProLogic decoding and a frequency response of 50-20kHz. **Also brand new for your PC...** The DDU220E/H DVD-ROM drive from Sony (1800 226 429, www.sony.com.au). The new DVD-ROM kit includes MPEG decoder card and cables. It offers 5X DVD playback and operates as a 24X CD-ROM drive. It is priced at \$799 and comes with two free DVD titles. **No matter what sort of system and peripherals you run, you'll always need to protect your investment...** American Power Conversion (APC) (02 9955 9366, www.apcc.com) has added two new models of UPS (uninterruptible power supply) to the SmartUPS product line. The new Smart-UPS 420INET and 620INET offer increased battery life and runtime to protect your system from power surges and drop-outs. These new UPSs are suited to small business, departmental and SOHO applications prices start from \$557.



PERIPHERALS

Network administrators have always had to trust users to delete old files cluttering their networked PCs. Quarterdeck (1800 659 041, www.quarterdeck.com) changes this with **CleanSweep for Administrators** (\$899 per 25 seats). This uninstaller makes sure that useless files are cleared regularly while preventing users from deleting critical files. This program gives administrators the unique ability to create customised clients for users of different skills levels and even automate the entire process.

Like the personal version, the Windows NT-based CleanSweep includes Internet Sweep Technology for safe removal of cookies, plug-ins and ActiveX controls, plus automatic cleaning of browser caches. New network-specific features include the Configuration Wizard, which walks you through network installation, and the Configuration Editor, which lets you modify client configurations for either whole networks or individual clients. —Carol Mangis

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Looking at the Latest and Greatest

We have taken quite a few calls from would-be PC buyers this month who were chasing up several of the sub-\$2000

systems featured in last month's issue. It appears that several of the vendors were "out of stock" of their bargain high-performance systems and attempted to entice the buyer to consider a completely different spec'd system. Now I can understand a particular motherboard, brand hard drive or any other single item being temporarily out of stock, but one poor buyer was offered a completely different system.

The buyer admitted to being a little PC naive and so contacted us to check if he was getting good value for money on the alternate system. To put it bluntly, he was not. The buyer was being offered a system with less RAM, a smaller hard drive and a far inferior graphics card for more money—\$2400 in fact. Now this may simply have been the machinations of a single sales staff member that wanted a higher margin than that offered on the \$2000 system. We certainly acknowledge that these systems would have a very slim margin indeed.

However if we confirm that this is happening with our own calls to the vendor, I will print the full details, including the company's name, in my column. We will carry out random spot checks on vendors to ensure that the vendor makes every reasonable attempt to honour the prices featured in the magazine.

In last month's column I mentioned we were looking to buy a new digital camera but had yet to decide on which model suited our needs. Well, we decided on the Ricoh RDC 4300 although it was a photo finish (excuse the pun) between the Ricoh and the Kodak DC260. Why did we choose the Ricoh? Both cameras featured 3X zoom, macro, brilliant picture quality and, in Kodak's case, a very easy-to-use menu system. But what tipped us in favour of the Ricoh was the phenomenal crispness of macro and component shots and although not available at the time of testing we have also purchased a floppy adaptor for the camera. Once you have taken your snaps you simply remove the Smartmedia card slot it into the floppy adaptor, put the adaptor into your floppy drive and then you can read your 8MB Smartmedia the same as any floppy disk.

We have had some fun looking at a few neat new products this month: we were like kids in a candy store with the new 3D cards and the awesome Sound Blaster Live. I mentioned in First Looks that upgrades were imminent

for the Live and just this last night downloaded the new 512-voice software upgrade for the card. And if you are

wondering how good it sounds with 512 voices—I don't know. I simply do not have a MIDI file that goes much over 256 voices, let alone 512, and until I get around to putting one together, the extra voices is simply a numbers game.

We've been testing some new processors over the last month, and I was especially interested to see how much grunt the new K6-2 had. The K6 system we're looking at has 64MB of 100MHz SDRAM, a necessity as the K6 has a 100MHz external bus, and a Voodoo 2 card, so it should be a pretty cool games machine. At the same time we received a new Celeron A 333MHz CPU from Intel. Unlike the earlier Celerons which were cacheless, the Celeron A features a 128KB cache, but unlike the old Pentium II's 512KB of cache the Celeron As run at full bus speed: 66MHz compared to the PII's 33MHz. We were very interested to see how much the speed increase would offset the smaller cache size.

We ran some quick benchmarks (by no means exhaustive) on the K6 and Celeron compared to a Pentium II 333.

Test	AMD K6 2 3D 300	Celeron A 333	Pentium II 333
CPUmark32	800	616	842
FPUmark	1070	1780	1710

Several of the results were surprising to say the least, the K6 has a very strong integer unit on par with a Pentium II 300, but its floating point is quite poor, around two thirds of a PII 300. The Celeron actually has stronger floating point performance than the PII but its integer performance appears to suffer considerably, even with the full speed 128KB cache.

But wait—the story does not end there. We then completed more tests on the Celeron and PII on the same Iwill motherboard. The lower integer performance did not have such a great impact on applications and the Celeron managed 24.7 in Winstone 98 compared to the PII's 25.2. However, if you want a games chip the Celeron appears on par with the PII. In Turok and Forsaken with a Matrox G200 card the Celeron hovered a couple of fps on either side of the PII. ■

We've been testing some new processors and I was interested to see how much grunt the K6-2 had.

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DIGITAL VIDEO: CANON MV100

DV for the Masses

By Jan Ozer

With a price of \$2999, Canon's MV100 digital video (DV) camcorder is within the price range of some analogue camcorders, but it delivers better-quality video and a richer feature set. Combine this with a modular, compact design and DV FireWire output, and you've got an ideal camera for consumers and low-end multimedia applications.

The MV100 is shaped and held like a compact 35mm camera and fits in a suit pocket or purse. You view and replay through a 2.5in LCD panel and shoot using controls located by your right index finger. A small mesh-covered microphone on top of the unit captures audio, with an on-board speaker for playback.

Zoom controls are conveniently located by your right thumb, with intuitive playback controls by your left index finger. The LCD panel swings up 180 degrees, allowing subjects to view their own video feed; you can also convert the LCD to a viewfinder with a supplied attachment.

Ports on the camera include DV-out and a headphone jack, with a supplied docking unit providing stereo audio and S-Video and composite video outputs, along with microphone input and a LANC connector. Other components that are included with the MV100 are an AC power adaptor and battery charger, a lithium ion battery with a 50-minute recording capacity and 90-minute recharge time, a remote-control unit, S-Video, composite and stereo audio cables, a shoulder strap and a 30-minute MiniDV cassette.

For a consumer-oriented camcorder, the MV100 is full-featured and highly programmable. The camera has an 11X optical zoom and 44X digital zoom, automatic image stabilisation, a shutter speed of up to 1/8000 second, plus/minus 11 EV exposure compensation, and a minimum shooting distance of 9mm.

The camera can operate fully automatically, or you can set focus, exposure, shutter speed and white balance manually. The MV100 also has five programmed modes—sports, portrait, spotlight, sand and snow and low light—with controls optimised for each condition.

The MV100 ships with seven digital effects—three to begin or end a scene (fade, wipe and scroll) and four to use



throughout a clip (solarisation, black and white, sepia and strobe). Other options include 16:9 recording mode for playback on wide-screen TVs, 12- or 16-bit audio capture and wind-screen filters for the on-board microphone. You select options through menus displayed on the LCD screen.

Like all DV cameras, the Canon MV100 digitises and compresses video during capture, storing up to 90 minutes of video in digital format on the matchbox-size Mini-DV cassette. During still-image capture, the MV100 holds each image for 6 seconds (which lets you create a short audio description of the image) and has about a 500-image capacity.

DV is a high-quality format, featuring 500 lines of horizontal resolution, component colour and a high signal-to-noise ratio. This translates to noticeably better video quality than such analogue formats as S-VHS, Hi-8, VHS and 8mm.

The most significant advantage of DV is that it can be downloaded directly to specially equipped computers using an IEEE 1394 (FireWire) connection. Essentially a file transfer, this transaction doesn't degrade video quality. By contrast, the analogue formats mentioned above are captured with traditional analogue capture cards, which typically degrade quality even further.

We tested the MV100 in a number of conditions, indoor and outdoor, in bright and low light. In general, the camera was easy to point, hold steady and shoot, especially when we used the viewfinder attachment.

Controls were accessible and logical in operation, allowing a number of "no look" actions.

During our tests, we shot most video in automatic mode, finding that the programmed modes—particularly those for low light—produced disappointing results. As with most digital zooms, the MV100's picture became a bit fuzzy at high zoom ratios, so we disabled the digital zoom for most videos.



DON'T MOVE: Canon's use of interlaced DV format means poor quality still-image capture in all but the lowest motion shots.

To test video quality, we shot side-by-side videos with the Sony PC-7, comparing the results on television and on disk after capture with the Miro DV300 FireWire adaptor. In general, the MV100's

video quality was noticeably superior, with sharp edges, crisp detail and minimal noise and aliasing, though colours were slightly muted. During capture, the MV100 worked well with both the DV300 and DPS Spark FireWire adaptors, boding well for compatibility in the field.

Still-image tests were less positive, however, resulting from the camera's use of the interlaced DV format for still-image capture. When motion was minimal, still-image quality was excellent. But even moderate motion caused obvious de-interlacing artifacts, which manifest as visible slices and blurriness.

If video is your primary interest, the MV100 is a great value and should lead DV's migration from the professional market into the consumer space.

Canon MV100 Digital Camcorder. Price: \$2999. Canon; Ph: 02 9805 2000, Fax: 02 9888 1426; www.canon.com.au

DOCUMENT MANAGERS: CAERE PAGEKEEPER

Organise the Chaos

By David Haskin

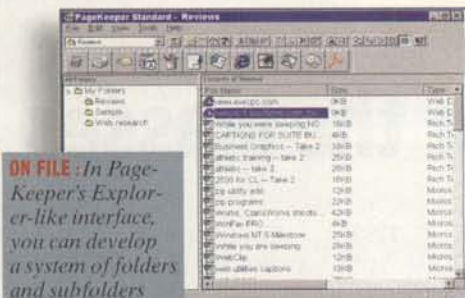
With scanner prices plummeting and Web content expanding, many people need help managing the flood of information. PageKeeper Standard 3.0 (\$99), newly redesigned to resemble competing document managers such as ScanSoft's Pajis Pro and Visioneer's PaperPort Deluxe, is a simple solution to this complex problem.

Like its competition, PageKeeper has a Windows Explorer-like interface that displays user-created folders in the left pane and the contents of folders in the right. You place items in PageKeeper folders by scanning documents or adding files from your hard disk or pages from the Web. This last capability makes PageKeeper a good tool for collecting and managing information mined from the Web, although the software can't automatically add the

page currently in your Web browser; instead, you have to type the URL.

Unlike PaperPort Deluxe, which imports documents into a proprietary database, PageKeeper keeps them in their original file formats and locations on your PC. PageKeeper automatically creates a small control file for each document you add that contains the file's location, any text within the file, and keywords you optionally include. The software then automatically updates the control file if you delete, move or change the source file.

You view information either with PageKeeper's built-in viewer or by clicking a toolbar button to load the document and the application associated with it. You can search from within PageKeeper or with a dialog box placed by PageKeeper in the Find submenu of the Start menu. Searches can look for



ON FILE: In PageKeeper's Explorer-like interface, you can develop a system of folders and subfolders for storing documents.

text contents of files, keywords, or file names.

PageKeeper Standard 3.0 is easy to use, but it's less powerful than its competitors. The program doesn't support Boolean searches or rank results by relevancy, for example. In addition, PageKeeper doesn't index documents, but rather searches sequentially through all the words in the documents, a comparatively slow process. For instance, a search of 80 Microsoft Word documents took about 6 seconds, and a search on the same word in about 1000 files indexed by Pajis Pro required just four seconds.

Because PageKeeper Standard 3.0 requires more time to search as the number of documents increases, it's unsuitable for managing large numbers of

documents. But PageKeeper's approach may be preferable for small numbers of documents, because it creates and updates control files almost instantaneously (updating an index can bog down your computer).

PageKeeper Standard 3.0 isn't as powerful as similar programs, but it is an inexpensive and convenient way to gain control of your documents.

PageKeeper Standard 3.0. Price: \$99. Requires: 16MB RAM, 35MB hard disk space, Microsoft Windows 95, 98 or NT 4.0. Performance Sales; Ph: 02 9450 0777, Fax: 02 9450 0779; www.caere.com

UTILITIES: UNDO-IT

Protecting You Right Down to System Level

By Jim Freund

Before Windows, before suites, and before most software products included the kitchen sink, there were utilities—marvelous individual little programs that set out to do just one thing and do it well. For a while there was a dearth of such programs, but recently they seem to be making a comeback. One of the most useful new utilities on the market is Undo-it 1.1 from Kiss software.

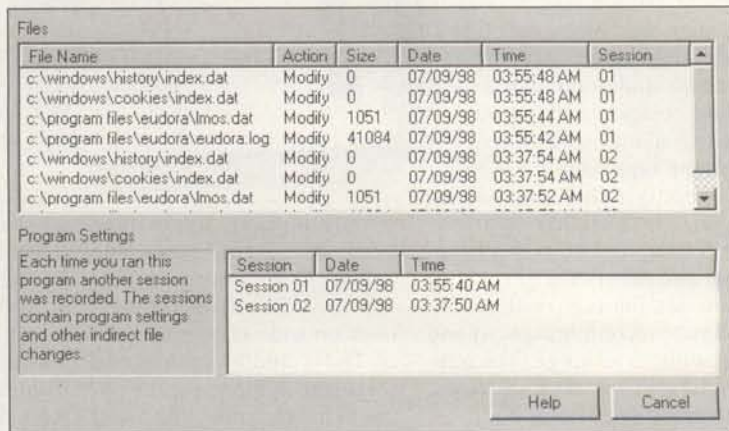
As with most good utilities, Undo-it sets out to correct a perceived deficiency in the operating system: the lack of an undo capability at the system level. This can have serious

consequences: for example, although the Windows Recycling Bin doesn't delete files until you specify that they be deleted, your all-important Registry is unprotected. Undo-it maintains its own bin of backups. Whether you are running an application or working on the desktop, Undo-it tracks all your actions, backs them up, and gives you an opportunity to take back any given action.

For the most part, you'll never know it's there. Undo-it lives in your system tray, in the

lower right-hand corner of the Windows 95 taskbar. Clicking on the tray icon calls up Undo-

it's menu, which includes Undo Files and Undo Programs. The former deals mostly with desk-



Undoing actions taken within a program can extend to entire sessions, or you can simply undo changes made to a file.



Canon's patented new LIDE technology helps these new scanners break the price/quality barrier.

Reinvent is the most over used word in the computer business. But this time it's true. Canon has just reinvented scanners.

And not a little bit, but completely.

Introducing LIDE.™ Using a new, patented technology called LIDE (LED Indirect Exposure), we have fundamentally changed the way scanners work, and their price/performance ratio.

LIDE eliminates the need for costly, complex optical mirrors in image acquisition, while it maintains superior image quality and colour clarity.

Easy to use. At the same time, LIDE allowed us to design a smaller, sleeker scanner with an exceptional combination of beginner and expert controls, and with easy to connect (daisy chain) parallel port connections for Windows® 95/98 and NT 4.0.

The new CanoScan™ FB 320P and FB 620P offer a choice

of 300 or 600 dpi optical resolution, plus enhanced resolution up to 2400 dpi* and 30-bit colour acquisition as standard.

Full software suite. Both come with everything needed to begin scanning immediately. The CanoCraft CS-P software works for both stand-alone image acquisition, and as a TWAIN driver for other applications. It features new, easier to use controls, and advanced controls for colour matching and image definition. Also included are PhotoExpress for image editing and OmniPage LE for OCR, a CD-ROM with full tutorial and user's manual, a parallel cable and power supply.

Canon Customer Care. The FB 320P/620P scanners feature a one-year warranty upgradeable to three years for minimal cost, and are backed by unlimited hot-line support.

The new CanoScan FB 320P and FB 620P. You can see they are different at first glance. To learn more call 1 800 021 167.



FB 320P – \$229^{RRP} and FB 620P – \$299^{RRP}

Canon

top actions taken: renamed, deleted or installed files. It can also restore files corrupted by a virus. The latter refers to actions taken within an application. For example, Undo-it can undo changes made within a file you were editing; you can also select a specific session in which you ran the program and undo everything that occurred, such as a change in

your preferences, or renaming a file accidentally.

Undo-it doesn't save actions ad infinitum, of course. Its backup bin defaults to 20MB (after which it drops the backups at the bottom of its list), but you can adjust the size.

The Find module has tabs that break actions down into Create, Modify, Rename, Copy, Move and Download

(which we found most useful). The Options menu permits you to have Undo-it ignore e-mail and files from Usenet, the Recycle Bin, large image files, or any particular class you specify with a customisable filter. This helps keep the database leaner and your system running faster. You can also update the software online.

Given all the effort Mi-

crosoft puts into creating (or licensing) software utilities to include in its operating systems and environments, we applaud Kiss Software for bringing an essential and innovative tool like Undo-it 1.1 to market independently.

Undo-it 1.1. Price: \$69.95. Marketing Results; Ph: 02 9899 5888, Fax: 02 9899 5728; www.kissco.com

SOUND CARDS: SOUND BLASTER LIVE

More than AWE-Inspiring

By Steve Turvey

I was perfectly happy with my AWE64 Gold—that is, until Creative sadistically sent me their new Sound Blaster Live PCI card. Don't get me wrong, the AWE64 is still a great midi sound quality card that few can match, but it does have its limitations. For a start, the AWE64 is only an ISA card and consequently has bandwidth problems coping with the huge amounts of information that modern games try to throw at it. To be blunt, the card can choke on the demands of some games, and sounds are sometimes dropped or chopped off midstream. As far as 3D sound is concerned, forget it, the AWE64 just ain't in the race.

The Live comes in the usual glitzy Creative packaging and thankfully includes a great swag of software and utilities. The card is PCI so bandwidth problems are not be an issue. The AWE64 was based on the EMU8000 sound processor chip which was capable of 32 hardware voices with a further 32 voices supplied by software thanks to the PC's CPU. The Live has the next generation EMU10k sound processor chip with two million transistors and a very impressive 1000 MIPS of processing power. According to a contact at Creative, many of the impressive demos that ship with the card only consume about 15 percent of the EMU's processing power.

Sounds are all processed at 32-bit precision at 48kHz and real-time effects such as echo, reverb and auto-wah are easily added. The Live has 64 hardware voices and additional 192 software voices for a total of 256 voices. The US Web site also indicates and there appears to be a future upgrade to a total of 512 voices in the pipeline.

The additional processing power is put to good use supporting Direct Sound 3D and Creative's own extensions called Environmental Audio Extensions (EAX). In Creative-speak EAX models your 3D sound space to accurately position audio objects and their sound reflections. Sadly, the card does not support A3D, a pity because of the rather large and growing support for this standard. For those of you still playing some of the great old DOS games Creative assure us the Sound Blaster compatibility is "near-perfect" (in their words).

The small card follows the AWE tradition and is impeccably manufactured, complete with gold-plated external connectors. Unlike the AWE, the Live has plenty of internal connectors as well with five connectors for CDs, DVDs, modems and the like. The kit we received for re-

view had an additional external digital I/O board, which may not be available with the "Value Edition" of the Live. There are two speaker outputs for the four-speaker surround sound, mic, line-in and joystick on the Live card. Located on the external I/O board are two separate midi in and out ports, Digital S/PDIF I/O and a digital DIN connector that can provide future expansion up to eight digital speakers.

So what is the sound quality like? Excellent! I can think of no card we have tested that can eclipse the Live card. It ships with 2, 4 and 8MB wave table samples and as the card has no onboard RAM it utilises system RAM through the PCI bus for a maximum of 32MB of samples.

The midi sample quality really is first class with rich instruments—even the plucked guitar is realistic, if you get your hands on one just try the Ketar applet to see for yourself.

The wealth of software supplied with the Live is far to extensive to go into here but a few highlights were Cakewalk Express Gold for midi sequencing, Sonic Foundry Sound Forge for WAV file capture and manipula-

tion, Unreal Special Edition, Sound Font library and an excellent pop-down task bar that holds the majority of the applets and environment controls.

We threw several games at the card including Forsaken, Incoming, Quake II, Turok and the only EAX aware game that came bundled with the card; Unreal. The card took all the multiple sound streams in its stride without a hitch. Creative supply Environmental Audio settings for many of the games that do not directly support EAX but these simply appear to have reverb added to them so for example Turok has plenty of echoes in the cave scenes.

Unreal was a different proposition: with its full audio positioning, as you walk past a burning torch its sound image also moved past you. Our test system was an Iwill motherboard with a Pentium II 333 and 64MB of SDRAM, Creative Graphics Blaster TNT and a Maxtor 91000D8 hard drive.

The test speaker system, PC Works Four Point Surround, was actually bundled with the Live card. This is quite a neat speaker setup comprising four tiny speakers with surprisingly good sound and a large powered subwoofer that also provides the amplification for the satellites.

In a nutshell, the Sound Blaster Live and PCWorks speaker system is an awesome package.

Sound Blaster Live. Price: \$499. Creative Pacific; Ph: 02 9906 8887, Fax: 02 9906 5577; www.cpl.com.au



It is no mean feat to make Australia's most popular printer for home and small offices better than ever. But that's just what we've done with the new BJC™-255SP.

Use 75% less ink. Super Economy mode reduces ink consumption by 75% compared to Standard mode, and works for both black and white and colour. Combined with a high capacity, black ink cartridge, it can print up to 2400 pages in black and white, and up to 600 in colour using standard inks*. That's anywhere from two to five times the output of any direct competitor!

Fast B&W plus photo quality printing. Then, there is a choice of high-speed B&W, or three colour print modes – Normal, Fine and Photo. Photo mode emphasises highlights and contrasts, and improves half-tones by producing a richer process black.



Brilliant colour, super economy, optional PhotoRealism, improved Internet printing,
all for just \$199.

Optional PhotoRealism™ To this Canon adds the option of PhotoRealism inks, for photographic reproduction approaching silver halide quality. By layering inks in up to four densities, it produces up to four times the colour combinations of conventional CMY printers, for smoother colour gradations and more accurate colours in skin tones and other light shades.

Better Internet images. Image Optimisation takes low resolution Internet images (typically 72 dpi), and prints them at the highest resolution supported by the printer to reduce jagged edges and pixelisation.

Canon Customer Care. All Canon printers feature a one-year warranty, upgradeable to three years for minimal cost, and are backed by Customer Care hot-line support. Drivers are available for Windows® 3.1x/95 and Windows NT.



For all this, there's one thing we haven't changed, the price. It's still a low, low \$199 RRP. For more information call 1 800 021 167.



BJC-255SP colour Bubble Jet™ printer – \$199^{RRP}

Canon

* Based on 5% page coverage, Super Economy not available with PhotoRealism inks. Price shown is the recommended retail price including tax. Canon and the Canon logo are registered trademarks and BJC, Bubble Jet and PhotoRealism are trademarks of Canon Inc. Windows is a trademark of Microsoft Corp. in the U.S. and other countries. Canon Australia Pty Ltd ACN 005 002 951

CS/5263

DATA ANALYSIS: MATHSOFT S-PLUS

Analyse Visually

By Barry Simon

S-Plus started its life as a command-line statistical language. Now that MathSoft (the maker of MathCAD) has acquired S-Plus and Axum (the scientific graphing program), it has gained a visual soul. The Standard Edition (\$1395), which uses Axum technology, is simply a collection of graphical tools and 100-plus statistical

procedures. The full-blown language, command line and over 3000 functions are available only in the Professional Edition (\$3000).

New to Version 4.5 are wizards for making OLE in-place editable S-Plus graphs in Excel or SPSS. There's also the ability

to refit plots after visually eliminating outliers, drill-down capability in multiplot Trellis graphs,



NEW MATH: S-Plus features a variety of new graphing options.

column transform with functions and menu interfaces to resampling and cluster analysis.

S-Plus stands out for the ease with which you can analyse complicated data sets graphically. Select even noncontiguous data columns and you can create over 80 graphics types

with the click of a button.

Unique to S-Plus are what it calls Trellis plots. To make such a plot, start with a plot of one variable against another and then drag additional variables to the two-variable plot. What results is a collection of two variable plots, one for each range of values of the variables.

Another strong point is the program's impressive array of import formats, including Gauss, MatLab, SAS, Sigma Plot, SPSS and Systat. ODBC support also increases the import capabilities.

Statistical functionality includes regression (linear, user-defined nonlinear and loess), ANOVA, MANOVA, cluster analysis, two resampling methods, ARIMA, two time-series methods, three survival methods and four smoothing routines. The interface is a pleasure to use,

with a variety of tool bars, multi-tabbed dialogs and right-click menus.

It's natural to compare S-Plus with the SPSS 8.0, its most substantial competitor. S-Plus includes a wider array of statistical functions in its base product, whereas SPSS has more statistical functions available as extra-cost add-ons. Though Trellis plots give you some multivariable data slicing, they aren't as comprehensive as SPSS's Cross Tabs. On the other hand, graphics in S-Plus are better integrated, more intelligently set up, and easier to use. S-Plus is a superb tool for visual data analysis and statistical data mining.

S-Plus Standard Edition. Price: \$1395 (Professional Edition: \$3000). Requires: 32MB RAM, 80MB hard disk space, Microsoft Windows 95, 98 or NT 3.51 or later; Hearne Scientific Software; Ph: 03 9602 5088, Fax: 03 9602 5050; www.mathsoft.com/splus

NETWORK MANAGEMENT: MARIMBA CASTANET

Push Apps with Castanet

By Robert P. Lipschutz

Castanet addresses one of the classic time wasters in network management—software installation and updates. Version 3.0 adds improved application-packaging support and a new management suite for managing and monitoring the Castanet product suite.

By using an application resident on each desktop, Castanet can automatically install and update both off-the-shelf applications, such as Microsoft Word, and custom applications. Administrators package the applications remotely for delivery to users. Network administrators must decide which options will be installed for each application, which may annoy some end users.

Everything in Castanet revolves around channels. The Tuner (a Windows applications residing on each desktop) sub-

scribes to channels made available by a Transmitter. A channel will typically contain a single application, such as a custom Java application. Once the Tuner is pointing to the correct channels, installing or obtaining the latest version of an application is done automatically. (Castanet doesn't address the issue of software licensing.)

Castanet products come in three product suites: the Infrastructure Suite contains the Tuner and Transmitter, the Production suite contains tools to ready applications for use with Castanet channels and the Management Suite has tools for managing and monitoring Castanet products.

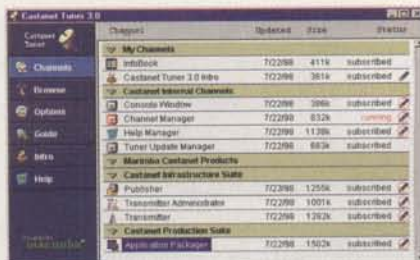
On the back end, an administrator uses the Production suite to prepare applications. The packaging process relies on the

fact that the result of an application installation is simply a set of directories, files and registry changes. By taking an initial snapshot of the computer, installing the application, and taking another snapshot, the Pack-

package applications separately for Windows NT and Windows 95 users since they may have different registry changes, but Castanet provides a way to hide this complexity from the users. By using what are called segments, all users subscribe to the same channel, and the Castanet tuner automatically distinguishes between Windows 95 and NT.

Castanet is best at handling homogeneous environments in which each application uses the same settings. But if sharing CD-ROMs hasn't solved your problems, the Castanet family is an ingenious way of centrally managing desktop applications.

Castanet 3.0. Price: approximately \$18,000. Requires: 16MB RAM, 14MB hard disk space (32MB RAM and 29MB hard disk space for Sun Solaris), Microsoft Windows 95, 98 or NT 4.0, Solaris 2.5.1/2.6, Netscape Communications; Ph: 1800 650 199, Fax: 03 9693 7699; www.marimba.com



UPGRADE: The Tuner subscribes to channels that house applications.

ager determines exactly what has changed. These changes are published to a channel on the Transmitter. The user never sees the installation process.

Administrators will need to

Better colour, Super Economy, fast blacks, PhotoRealism and optional scanner,
the BJC-4310SP does it all.

Drop Modulation
Technology™

PhotoRealism™

Optional scanner

Super fast blacks

It can cut ink consumption by 75%, be used as a scanner, improve printed images down-loaded from the Internet, or even print banners. And this is in addition to better colour for plain paper, PhotoRealism inks for the gold standard in photo quality printing, plus super fast B&W!

Better operating economy. Super Economy mode reduces ink consumption by 75% compared to Standard mode, and works in both black and white and colour. It can print up to 3600 pages in black and white, and up to 400 in colour!

Better on plain paper. Another feature is Canon's Drop Modulation Technology with dual drop sizes for smoother colour gradations. It is designed to produce better looking colour on plain paper, which also helps keep operating costs down.

The PhotoRealism gold standard. When quality is most important, there is the option of Canon PhotoRealism inks. They vary the saturation per pixel so that a single dot could

have 0%, 33%, 67% or 100%. This produces up to five times as many colour combinations as conventional CMYK inks, with better half-tones and almost no visible grain, even in areas of low colour density.

High speed blacks. A high-speed black ink cartridge with 128 print nozzles is included with your purchase. It is capable of speeds up to 510 characters per second (4.5PPM)²

It's even a scanner. The optional IS-22 scan head allows you to turn your printer into a colour scanner in seconds. It scans colour images up to 360 dpi and offers high speed B&W scanning for fax, OCR and copying functions.³

Canon Customer Care. All Canon printers feature a one-year warranty, upgradeable to three years for minimal cost, and are backed by unlimited hot-line support.

The BJC™-4310SP. Everything you could ask for in a printer, and a little more. For more information call us on 1 800 021 167.



BJC-4310SP colour Bubble Jet™ printer – \$299^{RRP}

Canon

Price shown is the recommended retail price including tax. Canon Australia Pty Ltd ACN 005 002 951. Canon and the Canon logo are registered trademarks and BJC, Bubble Jet, Drop Modulation Technology and PhotoRealism are trademarks of Canon Inc. All other trademarks are the property of their respective owners. 1. Output by cartridge may vary based on operating conditions. Super Economy page numbers are based on BC-20 black cartridge with 7.5% coverage and BC-21e colour cartridge with 5% coverage. Super Economy function not available with PhotoRealism inks. 2. Print speeds measured under DOS environment. 3. Fax, copy and OCR functions require user supplied software. Canon reserves the right to change specifications without notice.

8/98 CS5365

DEVELOPMENT TOOLS: JBUILDER 2 CLIENT/SERVER SUITE

A Common Language

By Richard V. Dragan

Inprise (formerly Borland International) has enhanced JBuilder 2 Client/Server Suite (\$3899) with unprecedented support for database and enterprise features. This new version also establishes a strong commitment to using 100 percent pure Java development and JavaBeans.

JBuilder 2's Integrated Development Environment's (IDE) familiar look and feel is based on Inprise's other RAD tools, such as Delphi. As with the other products, the emphasis is on component programming, in which properties are set visually and wizards help you write code.

With over 200 JavaBean components, the palette in JBuilder 2 is particularly rich. The JavaBeans range from basic UI elements to more advanced controls like grids and tables. There's also full support for the new JFC/Swing classes and an extensive array of database-aware components to show live data through JDBC.

JBuilder 2 also bundles JavaBeans from several leading Java component vendors, including KL Group, Object FX, Protoview and Roguewave. With this selection of components, Java interfaces can be just as sophisticated as those created for native operating systems using C++ or Delphi.

We were impressed by JBuilder 2's true two-way Java code editing. Changes to the source code are propagated to the visual design (and vice-versa) without any hidden sections of code or markers, as is the case with other Java tools. Such code intelligence is included in the product in several other areas, such as the new Code Insight feature, which provides context-sensitive pop-up help for writing methods with the proper argu-

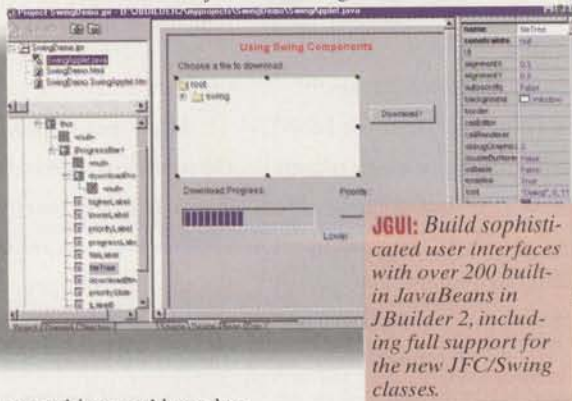
ments automatically.

In addition to basic programming smarts, JBuilder 2 improves its wizard-based programming tools. JBuilder 2 supports a wider range of basic target types to get you started, including custom JavaBeans and Enterprise JavaBeans. For server-side development, JBuilder 2 now supports Java servlets, as well as CORBA for distributed systems. To simplify creating custom beans, the BeansExpress tool now can add properties and methods to JavaBeans automatically.

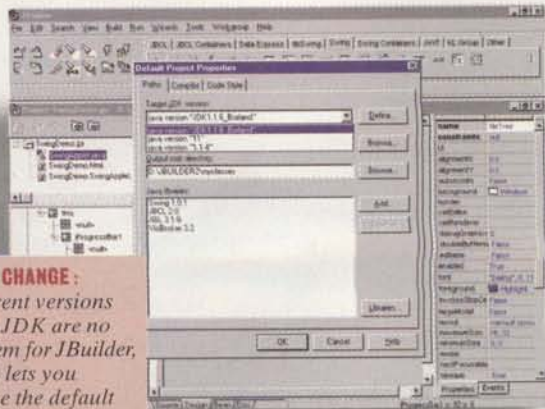
The main focus of the JBuilder 2 Client/Server Suite is on enterprise development and deployment. The wizards for creating database applications in JBuilder 2 offer a high degree of ease of use without coding. On our tests, we easily built a data-aware form using the powerful visual query designer.

JBuilder 2's tools offer just

and CORBA, JBuilder 2 bundles the VisiBroker for Java 3.2, an object-request broker. With the built-in wizards and compiler support, even fledgling programmers can call remote methods using RMI and CORBA/IIOP. (The compiler takes care of creating the Java bindings for distributed calls.)



QUICK CHANGE: Different versions of the JDK are no problem for JBuilder, which lets you change the default Java compiler and supporting class files.



JAR and CLASS files to any JBuilder 2 project more easily than with other Java tools.

JBuilder 2 has all the usual debugging features, including

watches, breakpoints and pop-up inspection windows. Although JBuilder 2 doesn't support an instant update feature, its Smart-Checker feature for dependency checking and its improved compiler makes rebuilding noticeably snappy.

When it comes to deploying Java executables, JBuilder 2's JAR wizard works for creating redistributable JAR files. Another winning feature is the Inprise Java Deployment Server—a server-side program that can automate the installation of JVM as well as your application files on client machines.

With its enterprise focus and good target flexibility, JBuilder 2 may well help realise the cross-platform vision of Java. Whereas other vendors are working to bring Java into the Windows fold, Inprise's JBuilder 2 stresses an open platform approach that will make the software an attractive solution to many large organisations that need to run Java programs on different types of hardware.

JBuilder 2 Client/Server Suite. Price: \$3899 (\$2799 upgrade). Requires: 48MB RAM, 135MB hard disk space, Microsoft Windows 95 or NT 4.0. Inprise; Ph: 02 9248 0900, Fax: 02 9248 0944; www.inprise.com

One of JBuilder 2's strongest features is its open architecture, which allows for switchable JDKs. We were able to swap the versions of the JDK (from 1.0.2 to 1.2) used to build a test Java application. JBuilder 2's highly extensible environment makes it possible to cope with the babble of today's different versions of the Java Virtual Machine (JVM). This configurability also opens the possibility of adding

about everything you'd need to build and deploy a sophisticated database using today's distributed architectures. A local SQL server InterBase is included, which can be used to develop and deploy databases. The middleware solution in JBuilder 2 is the Borland Data-Gateway for Java, which allows client-side Java apps to connect to databases using pure Java JDBC drivers.

For distributed computing



Canon BJC-80
\$399^{RRP}



Canon BJC-50
\$699^{RRP}

Advanced colour, cable-less communications, optional scanner plus two sizes that are

Small and smaller!

Canon has a wonderfully new idea for people that need a portable printer. A choice.

Drop Modulation Technology.

On the small side there is the BJC™-80. It is a fraction of the size of a briefcase. Yet, with its in-built sheet feeder and power adaptor included as standard, it is designed for people who have to produce high volume output from a very small printer.

Conversely, if size is critical, there is the brand new BJC-50 with in-built battery. It's not just small, at approximately half the size of the BJC-80 it's absolutely tiny.

Equally impressive, their performance is as big as their size is small.

Using Canon's advanced Drop Modulation Technology™ you can print everything from colour charts, to high quality photographs. Or, in seconds you can convert to extra high-speed black and white for finished business documents using the dedicated black

cartridge with 128 print nozzles!

For greater portability, both models include an infra-red port for totally cable-less communications with any suitably equipped Windows® 95 notebook or PC.

And, if you really need the functionality of an office in the space of a briefcase, both models will accept an optional colour scanner head in place of the print

Cable-less communication.

head. It takes only seconds to change the heads. You can then use the scanner head to acquire colour images, or for fax and OCR functions.*

Canon Customer Care. All Canon printers feature a one-year warranty, upgradeable to three years for minimal cost, and are backed by Customer Care hot-line support. Drivers are available for DOS, Windows

3.1x/95 and Windows NT.

If you need help choosing between small, and smaller, give us a call on 1 800 021 167.



The BJC-80 fits in approximately half the space of a briefcase. The BJC-50 is approaching 50% smaller still.

Optional colour scanner.

Canon portable colour Bubble Jet™ printers

Canon

*Scanner-head works with Windows 95 only. Fax and OCR software not included with purchase. Canon and the Canon logo are registered trademarks and Drop Modulation Technology, Bubble Jet and BJC are trademarks of Canon Inc. Windows 95 is a trademark of Microsoft Corp. in the U.S. and other countries. Canon Australia Pty Ltd ACN 005 002 951. Prices shown are recommended retail prices including tax.

CS/5420

LCD MONITORS: PRINCETON DPP 500 & STB GALILEO 15

The Digitals are on Display

By Alfred Poor

There's no doubt that LCD (liquid crystal display) desktop monitors look great—almost everybody wants one. For now, comparatively few people have them, primarily because they cost much more than a similar-size CRT (cathode ray tube) monitor and do not suit a typical user's budget. And there are some image-quality problems that can make an LCD monitor less appealing.

Those problems may just be on the verge of disappearing. How? First, increased LCD manufacturing capacity worldwide and better production yields have helped to drive panel costs down in recent months. Second, and even bigger news, is that digital interfaces now make it possible to improve image quality while lowering prices.

Digital connections for LCD panels are nothing new: notebook computers have used these connections for years, because they simplify the graphics and display circuitry required for the system and create a better-quality image. Desktop LCD monitors that used digital interfaces generally have not been favoured in the market. Why? Such a panel required a specific, proprietary graphics card, which in many cases didn't provide an attractive enough ratio of price to performance for the end user.

Instead, display manufacturers focused on creating LCD monitors that could connect to the standard VGA analogue port on just about any graphics

card. Though easier for the buyer, this created problems for the manufacturer.

Images are made up of digital data, but when run through a typical graphics card, this data

is lost.

With a digital interface, there are no phase or clock adjustments required; each pixel is displayed in precisely the right spot. There is also no flicker from slow refresh rates on an LCD panel, so you can set your graphics card to a 60Hz refresh rate, which can free up card bandwidth for faster image processing. All data travels to the monitor without error being introduced by two conversions, so a black pixel is displayed as black instead of dark grey, for instance. The result is a stunningly high-contrast image, which makes pictures look better and text look sharper.

Best of all, the manufacturer doesn't have to build expensive analogue-to-digital signal conversion hardware into the LCD monitor, this greatly reduces production costs. In the end, you can notice the difference at a glance—digital desktop monitors with digital interfaces are visibly better than similar products that try to work with analogue interfaces. Add the lower production costs and broad-based support among key manufacturers, and chances are good that you'll see a space-saving, eye-popping, flat-panel monitor on a desk near you in the near future. In this new field of digital desktop monitors, the Princeton DPP 500 is a value leader. Princeton's 14in, 1024 x 768 resolution display also includes an

ATI Xpert LCD graphics adaptor with the Rage LT Pro 3D accelerator chip. This package also comes close to parity with the cost of a 17in CRT and equivalent graphics card.

The only controls on the DPP 500 are power and brightness. The monitor is capable of producing deep-space blacks but does not handle dark and light shades of grey as well. The DPP 500 we tested also had two bright pixel defects—one of which appeared midway through our testing. The monitor's viewing angle was fairly wide as far as most of these displays go, but it was still weak when viewed from above or below.

Colour tones were excellent, and there were no colour-tracking flaws. Images were rock solid, and 9-pixel text was easy to read. The backlight illumination showed excellent uniformity across the entire screen. The only minor flaws were a bit of banding in the 256-colour ramps and some faint ghosting that was barely noticeable.

This panel is able to scale up lower resolutions to fill the screen. It also does a good job with 800 x 600 images using anti-aliasing techniques to



STB GALILEO 15

goes through a digital-to-analogue converter (DAC), which changes the digital on/off bits of information into a series of analogue waves. These waves are then transmitted to the monitor to form a pattern.

This analogue wave information is particularly well suited to CRT operation, because although a small amount of information is lost in the translation from digital to analogue, the difference is not enough to be noticeable given the limitations of human visual perception and the CRT's ability to reproduce subtle signal differences.

LCD monitors, on the other hand, fundamentally are digital products so converting the digital data in the computer to analogue data for transmission to the panel and then converting the data back again to digital information at the panel degrades image quality unnecessarily. As a result, some screen images and patterns may cause unwanted visual artifacts such as banding or jit-



PRINCETON DPP 500

Only Canon offers a way to acquire and print images in colour with a printer and scanner in one!

Canon has a unique solution to a question that has often plagued colour printer users. How do you get the image in, so you can output it to your Canon colour Bubble Jet™ printer?

Only from Canon. It is an optional scanner head that fits right into your printer, and it is available on several models for just \$149^{RRP}

It takes only seconds to replace the print head with the scanner head. This then allows you to acquire images for storage, editing, manipulation, placement on the Internet, or even OCR and faxing, with the right software.

Easy to use. To get you started, Canon includes image acquisition and editing software with your scanner head purchase at no extra cost! And using it, you can scan full colour or 256

grey-scale images in resolution up to 360 dpi. Or you can use high-speed mode if you simply want Black and White at 90 dpi, supported by most fax software.

Best of all, Canon offers a full range of models with this remarkable functionality. They are the BJC™-50 and BJC-80 portable printers, the BJC-4300 and BJC-4650!

Canon Customer Care. All Canon printers feature a one-year warranty, upgradeable to three years for minimal cost, and are backed by Customer Care hot-line support. Printer drivers are available for DOS, Windows® 3.1x/95 and Windows NT.

If you would like to learn more about how to get your printer to input as well as output, call us on 1 800 021 167.



The BJC-4300 with PhotoRealism.



The portable BJC-80.



The even smaller, portable BJC-50.



The BJC-4650 for Windows and Macintosh and sizes to A3.*

Optional scanhead – just \$149^{RRP}

Canon

* Available approximately August. Price shown is the recommended retail price including tax. 1. Compatible with Windows 95 only. Canon and the Canon logo are registered trademarks and Bubble Jet and BJC are trademarks of Canon Inc. Windows is a trademark of Microsoft Corp. in the U.S. and other countries. Canon Australia Pty Ltd ACN 005 002 951 CS/5332

smooth scaled text and images. The DPP 500 has built-in stereo speakers, which sounded a bit thin, and a microphone.

Although the panel may not be able to recreate dark and light details as well as some displays in this class, the Princeton DPP 500 is an attractive monitor—both in terms of price and performance—and a harbinger of the heated competition that is likely to become even hotter in this market before the year ends.

The STB Galileo 15, from STB Systems, is the Janus of the monitor world—being possibly the only product that can face two directions at the same time. It is targeted at financial installations where users need access to a lot of information in a small space.

You get a lot of monitor for the price: two 15in digital-interface LCD panels mounted on a single stand so that they can tilt and swivel independently, each with 1024 x 768

resolution. Separate data cables (using PanelLink technology but with different connectors than the DFP standard) lead from the back of each panel to a single proprietary PCI graphics adaptor. This adaptor, the STB Symmetry, is outfitted with a pair of S3 Aurora 64+ graphics processors. Essentially, you get the equivalent of two 17in CRT displays with a smaller footprint than one CRT would require.

The panel has no physical controls, and the software contrast control appears to have more impact on brightness than contrast. In any event, the display was excellent for text applications—just as you might expect, considering its target audience. The black level was convincingly dark, and image contrast was excellent. The panels showed no signs of ghosting or streaking, and the pixel tracking and moiré patterns were rock steady without any jitter or drift. Nine-pixel text was crisp

and clear.

These panels did have their weak points, however. They are only 16-bit panels, so they are not able to display more than 64 grey shades (and only 32 shades of red or blue). This resulted in banding on our colour ramp tests and limited ability to produce very dark or very light shades of grey. As a result, this is not the display to pick for graphics applications.

There were some other minor flaws. The bottom and top edges were brighter than the rest of the image on both screens. There was also one small bright pixel defect on each panel.

From a design standpoint, the fact that each panel has its own power supply and power cord seems somewhat clumsy and inconvenient; a single power cord and a single data cable would make desktop cable management easier.

The Galileo 15 comes with special software—called Mediator II—that treats the two

panels as a single display. Using it, you can drag windows from one side to the other at will or zoom your application window to full screen so that your spreadsheets fill both panels.

The one drawback is that STB only has Symmetry drivers for Windows NT 4.0; the display system is not yet available for Windows 95 or 98 installations.

The STB Galileo 15 is not for everyone, but it is well suited for its target market. If space is at a premium and you need access to enormous amounts of data from a Windows NT system, you may find yourself smiling into both faces of this unique display.

Princeton DPP 500. Price: Not available at press time. PC World; Ph: 03 9663 8222, Fax: 03 9663 82228; www.princeton.com

STB Galileo 15. Price: \$8519. Alfa Computer; Ph: 02 9317 3344, Fax: 02 9317 3859; www.stb.com

DESKTOPS: COMPAQ DESKPRO EN SERIES

Compact Corporate Client PC

By Eric Knorr

When was the last time you saw a full-size PC packed to the gills with graphics boards and hard dri-

ves? Most of the time the extra slots and bays sit empty—wouldn't you rather have a trimmer desktop system that saved you both space and

money?

Enter Compaq's Deskpro EN Series Small Form Factor, built around Intel's new microATX motherboard.

Just over 10cm tall, this midget machine is about half the size of your typical beige box. The EN model we tested had a 400MHz Pentium II, 64MB of RAM, a 6.4GB hard disk, built-in Ethernet and all the basics for a low \$3495. With all that hardware onboard, you may not mind that expansion begins and ends with one PCI slot and one shared PCI/ISA slot.

The Deskpro isn't the speediest 400MHz system we've tested; it came in behind full-size desktop systems. However, usability is top-notch. Swapping out

drives, the power supply, and the motherboard is a tool-free process. And the Deskpro supports the latest manageability standards, including DMI 2.0 and Intel's Wired for Management.

For example, a network administrator can boot the machine, lock the pop-open case, upgrade the BIOS and run a full array of diagnostics on the machine—all remotely.

In one tiny package, Compaq has stumbled onto something close to the ultimate client PC. It's dressed for a high-end work environment with first-rate components, yet it's compact and affordable enough to put on every desk.

Compaq Deskpro EN Series Small Form Factor. Price: \$3495. Compaq Computer Australia; Ph: 1300 368 369, Fax: 02 9418 9019; www.compaq.com.au



SPACE SAVER: Compaq's bantam-size corporate Deskpro EN features a 400MHz Pentium II, 64MB of RAM, a 6.4GB hard disk, and built-in Ethernet.



The PowerShot A5 is more than a digital camera, it's a Canon, which is why it's so small, so simple, so superior.

In a recent article Digital Camera said,

"For features, quality of output and price this little digi snapper should sweep the scene."

"Pick it up...it's tiny. Put it in your pocket...it disappears. Shoot with it...it's a dream."

Here's why.

Smallest in its class. The PowerShot™ A5 combines advancements in lens technology, micro-circuitry and digital image processing.

The result is a camera that is the smallest in its class, with full automation for beginners and the performance for advanced photographic needs.

The 810,000 pixel resolution is high enough to produce exceptional photo quality prints in standard size!

35 mm camera performance. Canon has cut the times between operations common to digital cameras by up to 80%. This greatly assists auto focus, auto and programmable exposure and colour correction. Viewing on the revolutionary polycrystalline TFT

LCD screen offers exceptional image detail and a wide angle with reduced distortion in the 5 cm display.

More advanced users will find TTL monitoring, a breakthrough aspherical lens, an advanced range of aperture, shutter and colour controls including a colour mosaic filter, white balance and 30-bit signal input.

Focal length – 5 mm (equivalent to 35mm for 35 mm camera).

Industry standard memory – Stores up to 66 images using 8MB CF card supplied.

LCD viewfinder.



Serial port – For PC and Macintosh connections.

Full software suite. It also has one of the most complete software packages imaginable to let Windows® 95/98/NT4.0 and Macintosh® users begin enjoying the benefits immediately.

Canon Customer Care. The PowerShot A5 features a one-year warranty upgradeable to three years for minimal cost, and is backed by unlimited hot-line support.

But then, what else would you expect from Canon? To learn more about our range of digital cameras call 1 800 021 167.



PowerShot A5 digital camera – \$1299^{RRP}

Canon

PRINTERS: NEC SUPERSCRIPT 870

Near-Perfect Pages

By Kyla K Calson

OK, so they're not as sexy as their colour cohorts. But let's face it, monochrome laser printers are your bread and butter when it comes to printing pages and pages of text. And your proposals and memos will look their best if they're printed on an NEC SuperScript 870, the update to the SuperScript 860.

When you uncrate the SuperScript 870, you'll find the sleeker external design its most obvious enhancement. Along with this new look, NEC has boosted the printer's paper-handling capacity. It now houses 150 sheets, and it supports up to 650 sheets with an additional



DESKTOP WORKHORSE
Raid petty cash for the 8ppm, 600dpi, laser-based NEC SuperScript 870.

paper bin.

The engine speed remains at 8ppm—great for most

stand-alone users—but NEC upgraded the processor from 50MHz to 60MHz. In our tests

we found that the first page printed in 20 seconds or less, no matter what type of file we were outputting. While not fast enough to outfit an entire department, the SuperScript 870 can double as a network printer for small workgroups of two to three people. NEC offers an internal 10/100Base-T Ethernet version.

The SuperScript 870's output quality is outstanding at 600 dpi (the same as its predecessor's), both for text and graphics.

The NEC SuperScript 870 carries on the tradition of high-quality, low-cost printing. And \$795 is a small price to pay for 600-dpi output and an 8-ppm engine.

NEC SuperScript 870. Price: \$795. NEC; Ph: 13 16 32, Fax: 02 9930 2020; www.nec.com.au

NETWORKING: 3COM OFFICECONNECT ISDN LAN MODEM

Small-Office Networking Made Easy

By Rich Schwern

You've got a smart team of coworkers and a healthy jump on the competition. But without fast, reliable network and Internet access, you're going nowhere. Until now. Thanks to a new hybrid product from 3Com, connecting your team to each other and to the world has never been easier—even for networking novices.

The 3Com OfficeConnect ISDN LAN Modem combines a four-port Ethernet hub with an ISDN terminal adaptor.

3Com is confident you'll have no trouble setting up the OfficeConnect—after a painless installation we can see why. A hand-

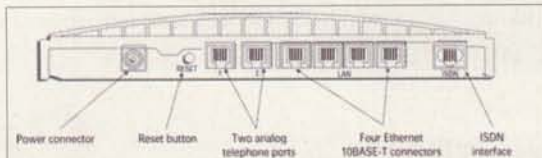
ard and a useful Getting Started Guide stepped us through setup, installation and configuration. We entered ISP and ISDN information, and the wizard took care of the rest.

Besides four 10Mbps Ethernet ports and a built-in ISDN TA, the OfficeConnect includes two analogue ports in case you want to plug in a phone or a fax machine to share the ISDN line. A useful OfficeConnect LAN feature is the built-in Dynamic Host Control Protocol (DHCP)

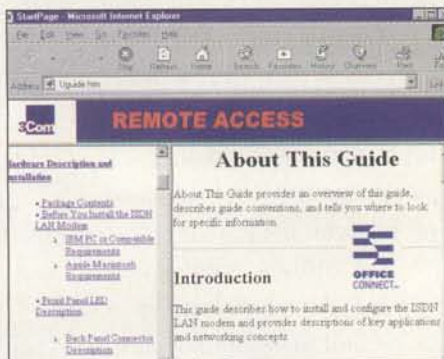
server, which supplies networking addresses automatically and keeps LAN management headaches to a minimum. Although the OfficeConnect is priced right and includes all the software and features you need for quick installation and reliable performance, it supports only ISDN. If you want analogue access via 56kbps or ADSL, or faster leased-line access, you have to look elsewhere.

The OfficeConnect goes a long way toward easing the networking burden for neophytes, and is a good, low-cost choice for small networks that need to connect up to four computers on a LAN and share Internet access via ISDN.

3Com Office Connect ISDN LAN Modem. Price: \$969. 3Com; Ph: 02 9959 3020, Fax: 02 9956 6247; www.3com.com.au



COME TOGETHER Need to network your team to one another and the world? Then check out 3Com's OfficeConnect ISDN LAN Modem.



HTML HELP The OfficeConnect includes HTML-based configuration wizards, help and other useful information.



The bible of the printer industry described the BJC-7000 as “absolutely breathtaking.”

Hard Copy Observer is arguably the most authoritative publication in the printer industry. In August 1997 they said this about the BJC™-7000:

- "...The BJC-7000 cartridges offer new capabilities never before seen in a desktop inkjet printer...
- "...including a unique new technology for pre-coating plain paper (P-POP) and support for seven colour printing...
- "...the result is a brighter, sharper image, and also a more durable one..."

We couldn't have said it better ourselves.

"7-colour process." Only PhotoRealism™ inks on the BJC-7000 use a 7-colour process with conventional CMY inks, lower density CMY inks, plus black. The result is a unique Canon process. The inks can be layered in up to nine saturation levels per colour, per pixel ... to produce up to 90 times the colour combinations of traditional inks. As a result colours have finer gradations without banding and lines, and even hard to produce light shades are exceptionally free of pixelisation.



Better plain paper performance. P-POP™ (Plain Paper Optimised Printing) bonds an invisible Ink Optimiser to the paper before inks are applied. The inks, in turn, bond to the optimiser. Text and lines are better defined, colours are more vibrant, tones are sharper, and print-outs become virtually water fast.

And a host of other features. The BJC-7000 can use both PhotoRealism and optional conventional inks with the black plus ink optimiser cartridge. Both cartridges produce an ink drop literally 1/4 the size of earlier models, plus resolution up to 1200 dpi. Better plain paper use can lower operating costs. It even has the ability to print full-bleed A4 full card stock at paper-weights up to 550 gsm (0.8MM).



Canon Customer Care. There is a one-year warranty, upgradeable to three years for minimal cost, and it is backed by Customer Care hot-line support. Drivers are available for DOS, Windows® 3.1x/95/98 and Windows NT.

No wonder Hard Copy Observer also said "Canon (has) seized the technological high ground ..." If you would like to learn more, call us on 1 800 021 167.



BJC-7000 colour Bubble Jet™ printer – \$499^{RRP}

Canon

PRINTERS: FUJI-XEROX DOCUPRINT N32

Get More from Your Network Printer

By Kyla K Carlson

No more standing in line waiting for handouts at the printer. Today's network printers are faster and smarter than ever, pumping out print jobs in record time and deftly delivering them to personal mail bins. Best of all, these sophisticated laser printers are priced to fit nicely into your department's budget.

Fuji-Xerox's DocuPrint N32 is a fast 32ppm printer capable of producing 600dpi printouts.

The Xerox printer addresses a growing network burden: users who print multiple original



WHY WAIT? The Xerox DocuPrint N32 prints well, and it sure is fast.

copies of their documents (or *mopies*, as HP calls them) rather than printing one original and making photocopies. To keep network traffic light, the printer uses a technology that sends a print job across the network only once, no matter how many copies a user requests. The printer then handles the multiple job requests locally, instead of clogging up the network.

Combined with these networking smarts are fast printing speeds. For lightning-fast printouts, you can't beat the DocuPrint's screaming 32ppm engine—we printed a 50-page word processing document in less

than two minutes.

The DocuPrint's 600dpi output isn't bad, but we detected some dithering in its printouts. We were especially impressed with the printer's innovative paper-handling skills. It comes standard with two paper trays, housing 500 sheets each, and a 100-sheet multipurpose tray, and offers expandability options to boost capacity to well over 3000 sheets. The mailbox and sorting options are first-class. The DocuPrint has a 10-slot bin that holds up to 100 sheets per slot. The DocuPrint's stapling bin doesn't include mail slots, but it holds 2000 sheets and provides three stapling positions. The printer is also capable of two-sided printing. Load up this printer with all its options and you'll be ready to ditch your copier.

DocuPrint N32. Price: \$5534. Fuji-Xerox; Ph: 1800 655 070, Fax: 02 9856 5003; www.xerox.com.au

GRAPHICS: APPIAN DUET

Duet Does Double Display Duty

By Arie Moller

If you're like most users, you probably have multiple applications running at the same time on your system—yet the popular paradigm is to try and squeeze all that information onto a single screen. Appian Graphics is offering an alternative solution: the Duet multimonitor graphics card, which comes in both AGP and PCI flavours. The Duet is most suited for business users who tend to run basic applications (like spreadsheets or text documents) but need to see a lot of data at the same time.

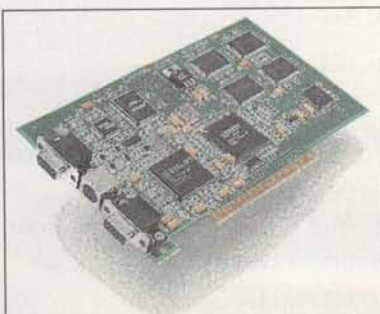
Unlike most dual-monitor graphics cards presently using two graphics chips with an internal bridge chip, Appian Graphics powers the Duet with a single S3 Virge/MX graphics chip, which is actually a mobile chip set. This is

fitting, since mobile chip sets already have dual out ports—one to drive a notebook's LCD and one to drive an external CRT monitor. Appian Graphics converts the digital signal inherent in a notebook's LCD to analogue to provide two analogue out ports. However, performance is hampered considerably.

The included HydraVision display-management software lets you switch monitors without rebooting, run the monitors at different resolutions and assign functions—like zooming, for example—to hotkeys.

Installation of the PCI version of Duet was simple. However, the test results were

not as promising. We ran the card in single-monitor mode under Windows 95 on our 266MHz Pentium II testbed at 1024 x 768



Appian's Duet won't give you great graphics performance, but it will provide a dual-monitor solution with only one available graphics card slot.

pixels with 16.8 million colours. It scored 56 on our Business

Graphics WinMark 98 test, a 33 percent drop from the score achieved by the system's original STB Velocity 128 graphics card. Using two monitors with a total resolution of 2048 x 768, we had to drop down to 65,536 colours because of the Duet's limited 4MB of graphics RAM.

In this mode, the card achieved an unimpressive score of 39 on our Business Graphics WinMark. Even though the Virge/MX is billed as a 3D-accelerated chip set, we saw little evidence of it.

Windows 98's native support for multiple monitors requires you to add a second graphics card. However, if you have only one PCI slot available for two monitors and need to display multiple applications simultaneously, the Duet will give you the extra viewing space that you need.

Appian Duet. Price: \$1075. Repro Image; Ph: 02 9557 2516, Fax: 02 9550 3865; www.appiantech.com

When it comes to superior paper handling, the BJC™-5500 has no rivals.

More paper feeds. It comes with a tractor feed to accept continuous form (computer paper), and a manual feed for cut sheets up to A2, or envelopes. To this you can add two optional cut-sheet feeds so, for instance, you could have letterhead and standard paper feeds at the same time.

To do more jobs. Obviously the BJC-5500 has the paper handling for almost every one in the office from accountant to artist, and engineer to receptionist. Its appeal is further

The Canon BJC-5500 can do something that no other printer can,
print more paper types.

Overheads

Computer

A4

broadened by the fact that the BJC-5500 is also an exceptional four-colour CMYK printer capable of producing text and graphic lines in resolutions up to 720 dpi.

At higher speeds. Whether it's a long spreadsheet, or a batch of form letters, the BJC-5500 delivers. Using the special black cartridge, the BJC-5500 prints close to 7 B&W pages per minute in high speed. It even offers an ultra efficient Economy Mode that reduces ink consumption by 67% vs. High Quality mode.

Canon Customer Care. Like all Canon printers it features a one-year warranty, upgradeable to three years, and is backed by Customer Care hot-line support. Both colour and B&W cartridges are included as standard. Drivers are available for DOS, Windows® 3.1x/95 and Windows NT.

To find out more about Canon's exceptional paper handling capabilities, call us on 1 800 021 167.



BJC-5500 colour Bubble Jet™ printer – \$1499^{RRP}

Canon

PDAS: REX PRO PC COMPANION

Rex Takes Your Input

By Kyla K Carlson

The original Rex credit-card-size organiser was a miracle of engineering with one small problem: you couldn't input data when away from your PC. Enter the Rex Pro PC Companion, an update to the tiny Type II PC Card PDA.

The most notable new feature of this upgrade is data entry—no PC required. But it's slow going. Lacking a keyboard, the Rex forces you to use its six buttons to toggle through the alphabet, the calendar, and more. Thankfully,

you can base information on previously entered data, so it's easy to add an appointment with an existing contact.

The updated Rex sports 512KB of RAM and supports up to 6000 records. Synchronisation has been improved as well. TrueSync Plus provides support for Microsoft Outlook 97 and 98, Symantec ACT, Lotus Organizer and Starfish Sidekick 98.

The Rex still doesn't

rival 3Com's Palm III or any of the Windows CE devices when it comes to a full-fledged organiser with input. But as ultraportable organisers go, it's hard to top the

Rex.

Rex Pro PC Companion. Price: approx. \$399. Franklin Electronic Publishers; Ph: 1800 882 5888, Fax: 02 9609 4935; www.franklin.com

POCKET PAL

Franklin's Rex Pro PC Companion now lets you enter data when you're away from your PC. Synchronisation is better too.



GRAPHICS: MACROMEDIA DIRECTOR 6.5

Set the Stage for Great Graphics

By Julie Polito

Have some respect for your audience. Don't force-feed them bland PowerPoint slides or cookie-cutter Web sites. Serve up something special—something that'll keep them on the edge of their seats—and keep them coming back for more. Macromedia Director 6.5 lets you produce business presentations that sparkle with flavour, without giving you a scripting headache when you make them. And your business customers will love you for it.

Director 6.5 includes several significant improvements, but it's not a full-fledged upgrade of version 6.0. Its goal is still to help novices quickly create multimedia animations, while letting advanced users produce eye-popping designs. At the heart of Director 6.5 is its intuitive Stage interface; you create interactive designs by dragging Cast Members—such as images and sounds—onto Scores, or series of frames in an animation.

But Director 6.5 brings

much more power to this virtual set. It's loaded with handy tools, and it works with all your favourite programs. To jazz up a PowerPoint file, simply import your slides into Director, and they're placed on a Score. Here, they're ready for sound, animation, and any other goodies you want to add.

And that list of goodies just keeps growing. Director 6.5 offers full Flash support, which makes it a cinch to import and manipulate Flash vector animations. There's also enhanced Windows support for QuickTime 3.0, allowing snappy digital video. You even get support for hundreds of ActiveX controls.

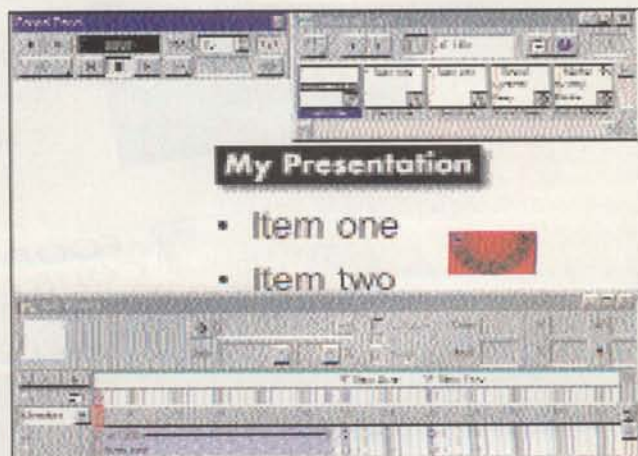
If you're creating files for the Web, you'll love Director's sophisticated Web features. You can now save Director files as pure Java applets. This lets all your Web site visitors view them even if they don't have the Director plug-in. You can integrate custom Java code into these files, and Director fits your applets to the right

Java classes.

Macromedia Director 6.5 also includes Aftershock 2.0, a utility that ports Shockwave

to do any scripting.

Of course, Director is still a complex program to master. New users will be able to create simple movies in no time, but the really fancy, professional-looking touches still require Lingo scripting, which isn't easy to pick up.



CALL THE SHOTS Want your next presentation or Web site to be a masterpiece? Use Macromedia Director 6.5. This upgrade has the same productivity perks as Director 6 and adds bonuses like Flash and Java support.

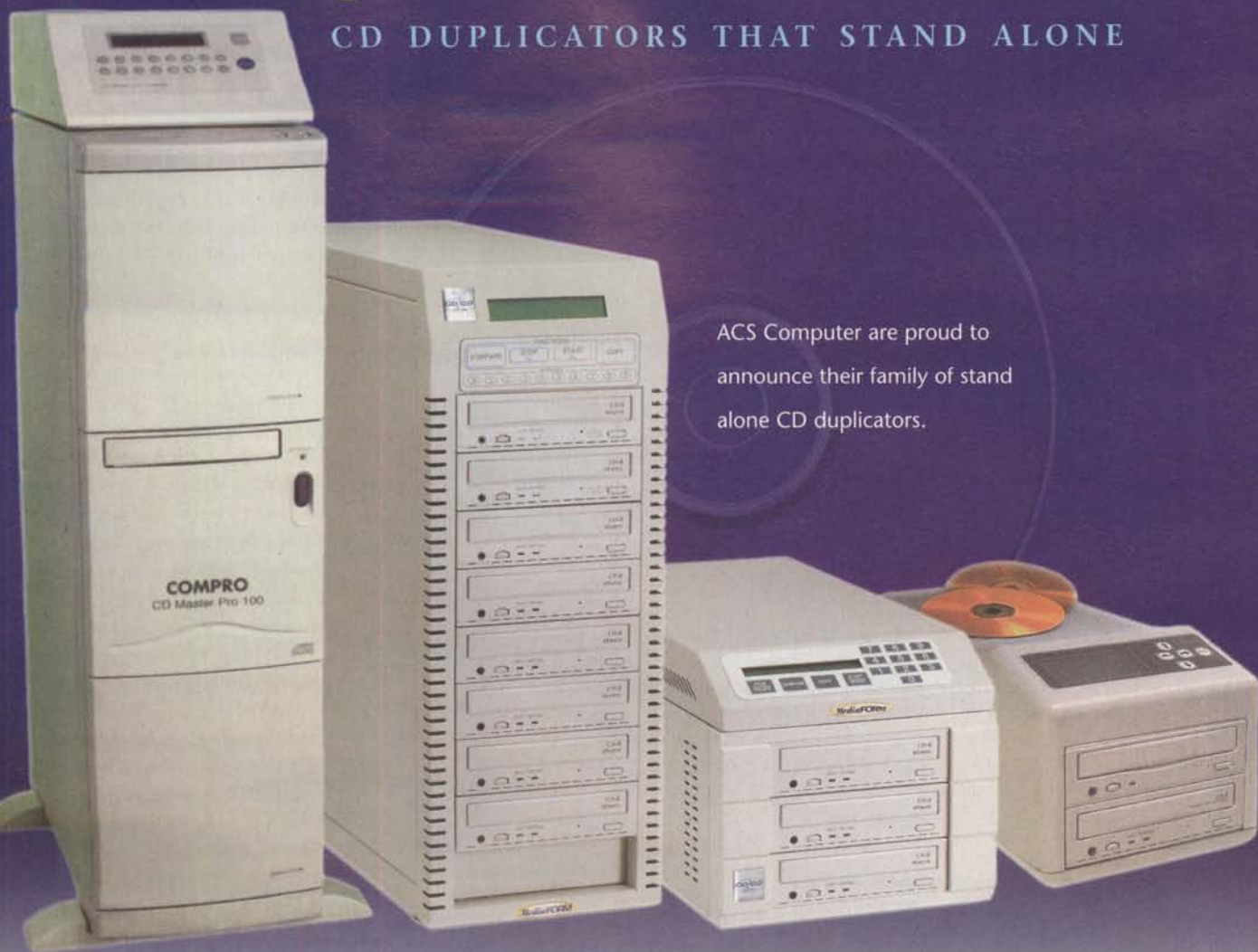
files to the Web with minimal hassle. Aftershock delivers Shockwave content to any Web browser (or platform with the appropriate HTML coding) without requiring you

Expect to spend a lot of time reading and learning the program if you want to take full advantage of Director.

While Director is now in version 6.5, its overall suite,

CD MASTERS

CD DUPLICATORS THAT STAND ALONE



ACS Computer are proud to announce their family of stand alone CD duplicators.

CD MASTER PRO 50/100

Automated Batch CD Duplication System

- Touch button operation
- Duplicates up to 50/100 CDs in 1 operation
- Automatic ejection of failed CDs
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- Field proven jukebox robotic
- Supports major CD formats including CD-ROM, CD Audio, mixed mode, CD-ROM XA, HFS, Unix & CD-Bridge.

CD2CD POWERPRO COPIER

The industry leader in CD-R copiers with one button burning of 8 CDs simultaneously, expandable to 64 drives, and autoloader ready. Supporting virtually any format, this system can copy up to 64 full CD-Rs in 18 minutes. The PowerPro is capable of allowing you to write your image to the hard drive while a first set of copies is made.

CD2CD COPIER

This stand alone system houses the smart controller, which identifies and copies complex formats on the fly, with or without the use of an internal hard drive. Support for up to three 4X recorders, and the CD-Autoloader is available. Audio users can take advantage of CD2CD's unique track extraction feature, where tracks from various discs can be mixed and recorded for specific jobs.

CD MASTER

Stand Alone CD Creation & Duplication system

- Easy CD to CD duplication
- Creates Audio CD from external audio source through Line in & Mic in
- Built-in 2 GB Hard disk for 3 hours of audio and data storage
- Built-in SCSI Interface for PC connection
- Supports major CD formats including CD-ROM, CD Audio, mixed mode, CD-ROM XA, HFS, Unix & CD-Bridge.

COMPRO

MediaFORM



ACS Computer (Aust) P/L

Authorised distributor for COMPRO and MediaFORM

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Director Multimedia Studio, remains the same version. In addition to the new 6.5 Director, the suite includes the same apps as before: Xres, Extreme 3D, and Sound Forge XP from Sonic Foundry. Most of these products are at least

two years old, and according to Macromedia, they are at the end of their life cycles, and there are no plans for new versions. It's too bad Macromedia didn't upgrade the entire Director Multimedia Studio suite to a 6.5

version and include some of its newer, Internet-centric products like Dreamweaver, Flash, FreeHand and Fireworks.

Still, if you want to make a big splash with your presentations and sites using the

hottest tools of the trade, Director 6.5 is an investment worth considering.

Macromedia Director 6.5. Price: \$1699, upgrade, \$359. Firmware Design; Ph: 02 4721 7211, Fax: 02 4721 7215; www.macromedia.com

Y2K: CHECK 2000 CLIENT/SERVER

Are You Ready?

By Alison Currie

Year 2000 conformity is generally understood to refer to the state where neither performance nor functionality is affected by working with dates after December 31, 1999. In particular, this means that date-based functionality must behave consistently for dates prior to, during and after year 2000; that in all interfaces and data storage the century in any date must be specified explicitly or by unambiguous algorithms or inferencing rules.

Greenwich Mean Time introduced Check 2000 Client Server to tackle these problems on five specified levels: BIOS; Operating System; software application; data that users insert into software applications and Data Exchange. This means it is ready to handle concerns such as: will the PC rollover correctly to year 2000? Is the operating system configured correctly? What are the year 2000 issues with the software applications on the system? Are there any data files using a short date format? How will data flow be managed between PC programs when one of the PCs has possibly corrupt information?

Installation of Check 2000 is

easy and it deploys automatically across the network. (Once using the software however, you will need to make sure that the display settings on your monitor are not set in large fonts or text will not be fully visible.) Unfortunately, although tests can be configured to start automatically upon logon, default settings require user intervention to obtain ID details. However, this can easily be rectified with a few INI file changes (the program provides step-by-step guidance for solving problems or where these need to be dealt with by the user, comprehensive advice on how to implement solutions is given).

Testing gives the user an easy-to-understand view of the year 2000 status of a PC environ-

ment. Another major advantage of this program is the time-saving qualities it provides: no user intervention is required to fix as much as 98 percent of the BIOS-level problems, and the real-time scan is much more accurate and faster than a manual audit.

In terms of presenting results, Check 2000 Client server includes a network reporter capable of producing year 2000 status reports, catering for management, technical staff or end-users. This application can also be modified independently if greater flexibility is needed.

The most impressive feature of this year 2000 package however, is the standard data scanner that scans files for data that might cause difficulties. These results provide not only the names of suspect files, but also their exact location—specific cells in an Excel spreadsheet, for example. This together with information regarding spreadsheet age and

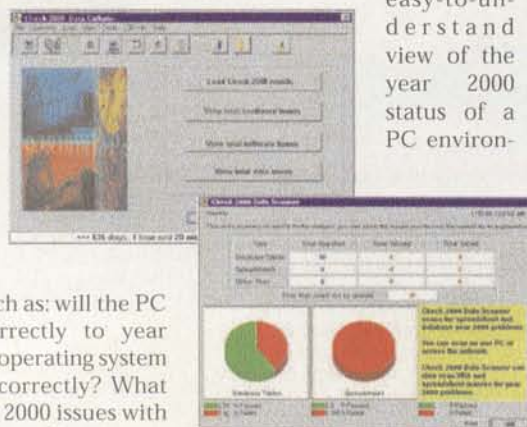
importance allows one to determine the significance of each data file and thus the level of priority each problem carries.

Check 2000 Client Server is a package that identifies, prioritises and provides advice on how solve your millennium problems, making it a very valuable tool indeed. Check 2000 Client Server Enterprise Edition can be run on stand-alone PCs or PCs networked under

Windows NT 4.0, OS/2 and UNIX. The software will run on DOS, Windows 3.X, Windows 95, Windows NT 3.x and Windows NT 4.x.

The designated master workstation will require at least a double speed CD-ROM drive, hard drive space of 50MB or more (depending on network size). Greenwich Mean Time also produces similar packages for the home and small business user to attack similar problems: Check 2000PC and Check 2000PC Deluxe.

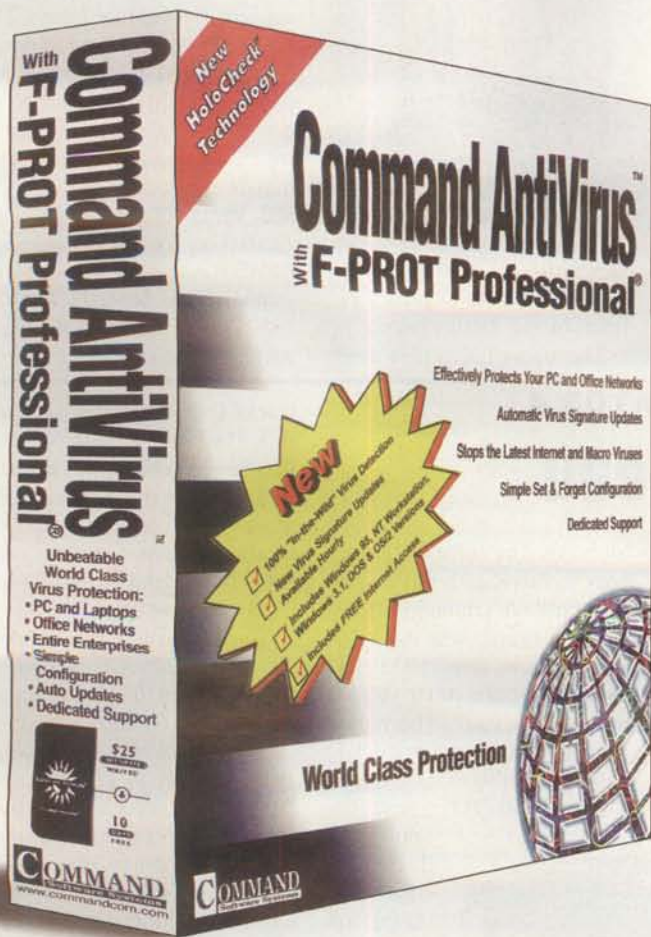
Check 2000 Client Server, Enterprise Edition, \$450, Enterprise Edition (authorised for a network of 5). Greenwich Mean Time; Ph: 03 9387 0311; Fax: 03 9387 2099; www.gmt-2000.com



STATUS SYMBOLS A top-down review of your network's year 2000 status helps you make informed decisions (above). Data Scanner (top) scans years of your valuable data-in spreadsheets and databases to find potential problems.

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PORTABLES: NEC VERSA LX

A Notebook Worth the Wait

By Bruce Brown

Though NEC was one of the last of the notebook manufacturers to release a Pentium II notebook in Australia, the Versa line that finally debuted was worth the wait. And now NEC is right on time with its 300MHz upgrades to that line.

With its sleek, silver polycarbonate case, the NEC Versa LX notebook stands out. It features a convenient three-spindle design and a travel weight of just 3.4kg.

And, with an eye toward MIS needs, the Versa LX shares common components across the range, including drive (save for floppy) and battery modules,

memory modules, AC adaptors and docking stations. This enables corporate customers to standardise and support users with a smaller inventory of parts. The 300MHz notebook comes with either a 13.3in or 14.1in TFT XGA display that uses NEC's 0.25in-thick screen technology, and it is powered by lithium ion batteries. There are deep palm rests and comfortable, quiet keyboards. (Unfortunately, the stereo speakers are positioned so that they are covered by the users wrists, but there are not many alternative positions.)

The Versa LX was an above-

average performer on our CPU, graphics and CD-ROM tests. Its Winstone and Disk WinMark



98 scores were average.

The unit lasted nearly three hours on our battery tests.

The Versa LX is also avail-

able in a 233- or 266MHz Pentium II processor.

We noticed no inconsistencies or operational hitches in testing.

NEC backs the notebook with a three-year parts-and-labour warranty; service and support is available 7 days, 24 hours. Good looks, good performance, and interchangeable parts make the Versa LX a great choice for corporate users, professionals and demanding mobile workers.

NEC Versa LX. Price \$10,010 (300MHz, 6.4GB hard drive, 64MB RAM, 14.1in XGA TFT screen). NEC Australia; Ph: 02 9930 2000, Fax: 02 9930 2175; www.nec.com.au

CD-ROM DUPLICATION: PSI PRO-CREATOR 4

Become a Service Bureau

by Chris Ralph

Most of us are content these days to copy one CD-ROM at a time to produce a backup copy of our favourite CD-ROMs. But if you are distributing custom software and manuals, catalogues, price-lists or a copies of your in-house Web site, burning a single CD at a time can be very time-consuming. If this is your situation, you can throw your hands in the air and trot along to the local CD duplication service bureau, or you can check into the range of solutions provided by Peripheral Sources International.

This month we had a look at the PSI Pro-Creator-4, which is the entry-level solution to burning multiple CDs at once. This package includes an Initio ExpressWay IN-9200UW Dual Channel BusMaster UltraWide SCSI PCI adaptor, an internal Teac CD-532S SCSI 32x CD-ROM reader, an external cabinet containing four Teac CD-

R55S 4x CD-R drives, Prassi's CD Rep CR42 software, and all the necessary cables.

Installation was a breeze. The Initio card plugged into a PCI slot, and a cable connected it to the internal CD-ROM drive. Then the cover went back on the PC, and the external cabinet was plugged into the power and the external SCSI port on the rear of the Initio card. After power up, the system auto-detected the Initio card but it took another boot-up before all the attached drives were detected. During testing we updated the flash EEPROM in the CD writers, which was a simple operation using the latest BIOS from the Teac Web site, to bring all the drives up to the latest spec.

Software installation was also very easy, with the InstallShield installation procedure covering

all bases. The software is very easy to drive, with the pop-up help balloons common to most good software these days. The system allows direct CD to CD copying, so once you have your master right, you can burn multiple copies of a source CD without creating a CD image on the hard disk. (Of course, the option is there to create the image on the hard disk if you require, and sometimes this is necessary when the quality of the source CD is marginal.)

You can create ISO images on the hard disk from a source directory, which allows the creation of an initial master disk or a one off. Multi-mode CD creation is possible, so that the data occupies the first session on the hard disk, with multiple audio

tracks following later on the disk. The Prassi software makes it as easy as possible, and it is actually one of the most recommended CD creation packages in the discussion groups we have checked out on the subject of CD burning.

The 4x burning speed of the Teac CD-R55S CD-R drives means that the 70+ minute times for creating a CD are history. We copied one of our utility CDs (which consisted of just over 628MB of information), and the four copies popped out of the drives at 19 minutes, 20 seconds. A single copy of another 613MB CD took 18 minutes and 44 seconds, which is exactly the same data rate of over 1.8MB per second. Both of these copies were duplicated directly from the master CD to the targets, without going via the hard disk.

For larger duplication requirements, PSI also have larger units available, in eight, sixteen, twenty-four and thirty-two drive configurations.

PSI Pro-Creator 4. Price: \$5995. Peripheral Software International; Ph: 03 9878 8611; Fax: 03 9878 8090; www.psiast.com.au





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FEATURES

- Dedicated 3D acceleration that delivers arcade quality 3D graphics acceleration featuring improved and enhanced visual realism
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- Scanline Interleaving (SLI) mode supported with two Righteous 3D II's (up to 1024x768 with Z-buffering) with two boards of the same memory configuration
- 3D API Compatibility includes Microsoft® Windows® 95 Direct3D®, Criterion® RenderWare® and Gemini Technology OpenGVS®



Raising The Performance Bar To A New Standard Of PC Arcade Acceleration

Enter the generational leap beyond in PC graphic-three-dimensional graphics with Orchid Technology's Righteous 3D II. Righteous 3D II, designed for the serious game player who demands the highest performance for games, delivers "Righteous Results". Brace yourself for revolutionary performance that produces explosive 3D images. Complex 3D environments are rendered at full speed to transport you into realistic 3D worlds. Impressive full motion fill rates accelerate all 3D features simultaneously without compromising visual detail. The only station you'll play is your PC with Righteous 3D II.

Next Level Of 3D Arcade Acceleration With Enhanced Visual Realism

Enhanced visual realism can't be measured, it has to be experienced. Righteous 3D II takes 3D graphics to the next level by delivering both a well rounded 3D rendering feature set and outstanding performance for a wide variety of gaming titles. Advanced filtering and anti-aliasing techniques produce smooth textured images. High precision 3D accuracy generates realistic three-dimensional objects. Transparent and translucent effects like fog, smoke and haze create stunning atmospheric conditions. Other special 3D features include morphing textures, animated surfaces and incredible lighting effects. Experience a new level of total 3D immersion with entertainment titles.

For No-Holds-barred Blistering 3D Performance

It's not just about 3D performance. It's about full feature performance with full speed interactivity. Other accelerators lack the power to perform multiple 3D functions while maintaining full motion frame rates. They are forced to compromise visual quality for real-time interactivity. Based on 3Dfx Interactive Voodoo2 Graphics, Righteous 3D II's triple 64-bit memory architecture provides direct access to the frame buffer and texture memory. This advanced design uses dual texture-processing units, each of which can apply texture to an object in a single pass. In addition, two Righteous 3D II's can be connected together to accelerate the next generation of games. When connected by an internal cable, the cards automatically enter Scanline Interleave (SLI) mode and work simultaneously on each frame of animation, which provides an impressive increase in performance.

Dedicated 3D Accelerator With Outstanding Direct3D Performance

Worried about 2D acceleration? Don't be. Righteous 3D II operates transparently with existing Windows accelerators without impacting 2D performance. Plug and Play compatibility with Microsoft Windows 95 features automatic configuration and trouble free operation. Righteous 3D II supports Windows 95, Direct 3D API to provide compatibility with a wide range of future 3D software titles.



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Your Guide to Locally Produced Products

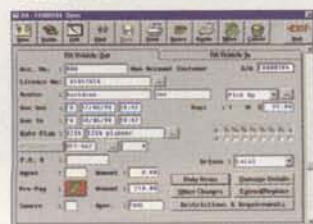
This is a new regular feature that gives small Australian software developers an opportunity to showcase their products.

Car Rental Manager

A true Windows based multi-user, multi-tasking, multi-location Car Rental Management system designed and developed in Australia to serve the rental industry.

The system is available in three versions—"Enterprise" for large networked corporations, "Lite" for medium size companies and Franchisees and "StartUp" for single locations and small operations.

CRM provides a complete solution for all Car/Truck/4WD/ Camper-vans etc type companies from Fleet management (including revenue made, buy-back and expenses), Financial monitoring, a sophisticated central Reservation system, Accident and traffic violation management (including capturing of pictures). Front Counter/Point of Sale functions are available in a separate module from all other "Back Office" Administrative functions.



The CASH at the front counter is monitored and full Audit trail facilities are also available. A comprehensive "Central Fleet" monitor status shows the busy branch manager all expected Out/In vehicles, in his branch or elsewhere in the network.

Non-Rent revenue movements are monitored and tight control over "Missing Kilometers" is bundled as a standard feature.

Bookings may be taken in one branch on behalf of another branch and both normal rentals (RA's) as well as "Long Term Leasing" functions are available.

A comprehensive set of over 120 reports are included to cover all aspects of the rental operation and a full integration to back office accounting is available as an option.

The system was released over three years ago. Its current version 2.20 has been installed in companies Australia-wide, from small (single branch operators) to the "Big" names in the Car rental industry. A CRM installation can be found in any city in Australia, from Cairns and Darwin to Adelaide, Perth, Sydney and Melbourne. Micro Knox, Ph: 03 9761 1122, Fax: 03 9761 1678.

Millennium Bug Toolkit

"Don't scrap your PC because of the Millennium Bug!" says Robert Gareb, Managing Director of Uniwell, whose company has a Money Back Guarantee on their product, the Millennium Bug Toolkit.

"Until now, many people have assumed that the only way to overcome the problem is to buy new PCs—this is absolutely not the case".

"We have developed a comprehensive set of hardware tests, available on a single disk, which will identify areas of weakness and install the appropriate fix. Most PCs will be unable to cope with the millennium without this kind of help, said Mr Gareb. "Our tests then go one step further to fully simulate the conditions which the PC will experience in the millennium to check the fix will work when it is needed".

In fact, Uniwell is so confident that they can fix almost all PCs, that they are offering a No-Fix, No-Fee Guarantee.

The revolutionary new product, Millennium Bug Toolkit, has many advanced features including a system which enables total protection of your software and data during testing conditions, comprehensive testing of date-critical conditions, and the ability to fully simulate the millennium and the validity of the fix now, before it's too late.

Mr Gareb said "The problem with the majority of testers and/or fixers available today is that they make assumptions about the way the PC will act, based on a few basic tests. We don't assume anything. Our tests (in the full package) force you to do power off-on tests including Century Byte Retention—rather than just simulating the conditions. Without these tests, Uniwell believes that any testing may be incomplete.



Technical information, an order form, as well as a FREE demonstration of the Millennium Bug Toolkit can be obtained via the internet on www.uniwell.com.au/pc2000/ Uniwell, Ph (02) 9365 3092, Fax (02) 9365 0017; e-mail: info@uniwell.com.au.

Norman Access Control Privacy

Norman Access Control Privacy (NAC Privacy) is an easy to use and extremely strong encryption and decryption product. Developed in Australia, Privacy boasts the strength of 448-bit encryption, while imported encryption products usually have a measly 40-bit or less!

Privacy's strength and ease of use makes it the perfect choice for corporate, government, educational and personal use. It is also a must for users of shared PCs, and all E-mail, Internet and notebook users.

Use Privacy to encrypt and decrypt: all data on a disk; a directory; a file; and any text that you can cut and paste, such as a paragraph in an e-mail or the contents of a cell in a spreadsheet.

It is so flexible it can even encrypt a single word or paragraph in an otherwise unencrypted document.

Privacy encrypts and decrypts information using a password (key) together



with the Blowfish algorithm. Because Privacy lets you use such long passwords, it also lets

you associate an alias to a password to make it easier to remember.

Privacy has a drag-and-drop feature that lets you encrypt or decrypt by simply dragging the source file or directory and dropping it on the NAC Privacy desktop icon, or on the NAC Privacy dialog box.

It also includes a self-decryption feature that lets people read your encrypted files without the need for them to install any specific software on their workstation. They can simply double-click the encrypted file and enter a password.

So if you're looking for a quick and effective way to keep your private data private, Privacy is all you need.

NAC Privacy is available on its own or bundled with Norman Access Control for Windows 95/98. It is year 2000 compliant. Recommend retail price is \$79. Norman Data Defence, Ph: 03 9562 7655; www.norman.com.au

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When users sign up for the JFAX service, they will receive a local telephone number in the area code of their choice linked to their e-mail account, which will serve as their universal inbox.

Local phone numbers are available in Sydney and in more than 55 cities around the world. This telephone number receives voice messages and faxes, which are then routed directly to the user's e-mail inbox.

Through the JFAX service, faxes and voice mails can be viewed or played using free software, which subscribers can download from the JFAX website at <http://jfax.com.au/sydney>.

Faxes can be viewed on screen, printed, edited or forwarded to other fax machines or e-mail users. Voice messages are sent and received as digital audio files, which can be played on the user's computer, or be sent as a paged voice message to any phone number in the world.

Users can also access a toll-free number in Australia, Europe and North America, to listen to their voice messages or hear their e-mails read aloud by a computer-generated voice.

In addition, the service also enables subscribers to listen to the headers of faxes, and to reroute both faxes and e-mails to a nearby fax machine. This service is available for Win 95, NT, UNIX and Mac users.

JFAX.com, Ph: 1800 708 108; www.jfax.com.au/sydney www.jfax.com.au/sydney for a demo of JFAX.

Australian Software information and downloads can be found at www.zdnet.com.au/ausoft

INKJET PRINTERS

Whatever your colour printing needs, there's a printer here for you. We test 21 of the latest models to hit the market.

By James Tod and the RMIT PC Test Lab staff

Like other areas of the computer market the inkjet printer range is markedly different today, than that of two years ago. Better resolution, higher quality inks, faster print times, longer-lasting cartridges and, above all, better-looking output are now the expectation rather than exception.

For this review we received 21 printers from the four major inkjet printer manufacturers, Canon, Epson, Hewlett-Packard and Lexmark. Five reams of paper were used to test these printers from top to bottom, with information such as pages per minute, ink cartridge life, quality on plain paper, quality on coated and glossy paper and driver functionality all playing a part in our evaluation. Overall, we were very impressed, with even low-end printers like the Canon BJC-255SP showing that quality does not only lie with

the more costly high-end units.

Some of the technological highlights of this review include the new HP 2000 series printer, with blazing text and graphics speed, showing it really means business. Canon's BJC-50 is not only tiny, weighing 900g and easily slipping into a briefcase, but it prints like a much higher end unit for a very satisfying (if slow) result. Lexmark's ability to print the best looking text in town, while managing fairly good graphics too is a credit to its engineers and makes the Jetprinter range very appealing. And finally Epson manage to hang onto top spot with their new Epson Stylus 740, a great all-round performer.

The bottom line is that for around \$350 you can be assured of finding a good combination of speed, reliability, longevity and excellent looking output in an inkjet printer. Spend a little bit more however, and you will

find all of the above and a good deal more: richer graphics, faster performance, more dexterous media handling and a result that will be envied by many.

Canon Australia

Canon BJC-50

Designed for those on the run, the BJC-50 is a highly compact and portable printer that really delivers in the quality and speed stakes, but was let down a bit by low-capacity ink cartridges. Priced at \$699 the BJC-50 is expensive, but would appeal to anyone who has ever left the office without a hardcopy, just don't expect laser-like quality.

This is the smallest printer we have seen to date, with the BJC-50 coming in 30 percent smaller than the already diminutive BJC-80. Included in the package is a Quick Setup

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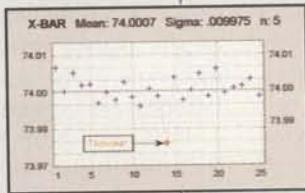
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HARDWARE

Inkjet Printers

Guide, User Manual and a Windows Print Guide. Installation was a simple affair with the Quick Setup Guide showing all the necessary steps, from installing the battery pack to connecting the power and parallel cables. If you get stuck refer to the troubleshooting section in the User's Manual, which is both comprehensive and clear. The drivers came on three disks, two for Windows 3.1/95 and one for MS-DOS.

Among the materials sent to the Lab was an IS-12 Colour Image Scanner Cartridge for the BJC-50 or BJC-80 printers, which enables you to replace the print head with a scanner head, turning the unit into a scanner. When hooked up, the device produced very good scans, even though the time for each scan was lengthy. The overall quality of the BJC-50 was very good indeed for such a small unit, with text and graphics quality rivalling that of some of the more expensive units. It had some difficulty with ink placement on plain paper, but the output was always appealing, especially on coated and glossy paper where the results were very good indeed.

If you have the need for mobility, then the

the computer lab. Canon offers a little more in this printer over the BJC-50, including a cut-sheet feeder and a longer lasting battery, but our tests also showed a slight slowing in performance when compared to the BJC-50. Priced at \$399 the BJC-80 still represents a very competitive deal with the A4 paper bin alone a very worthy addition, but it is not as compact or as light as its little brother, the BJC-50.

Setting up the BJC-80 proved no more difficult than with the BJC-50, with all the necessary steps outlined in the quick setup guide



and associated printed material. The printer uses a single black cartridge and a single tri-colour cartridge for text and graphics reproduction that was very good. As with the BJC-50 the BJC-80 can be turned into a scanner by inserting the IS-12 scanner cartridge. Tests were brief, but we did see scans that were more than acceptable in quality. Drivers for the printer are supplied on floppy, with the Canon Web site supplying later drivers if needed.

Printing on glossy or high-resolution paper produced excellent results that rivalled many of the more conventionally sized desktop units in terms of quality, but speed was not great and cartridge life is poor by anyone's standards. Text was well handled in most cases with some wicking and alignment problems evident, but they were not severe. Graphics on plain paper were bright and clear with a page of text and graphics taking on average 1.5 minutes to print.

You are unlikely to replace your current printer with this one, but if you need portability, space savings or the convenience of having a printer that doubles as a scanner, then the BJC-80 is an excellent choice, and must be given points for packing all that technology into such a small space.

Canon BJC-80. Price \$399 (as tested); Canon Australia; Ph 02 9805 2000, Fax 02 9956 8865; www.canon.com.au

Canon Australia

Canon BJC-255 SP

The entry-level unit for desktop users in the Canon range is the BJC-255SP three-colour ink jet, designed primarily for student and family users. Though it lacks the frills we would associate with a more expensive printer, it performed well and is a competent workhorse for budget-conscious buyers. Priced at \$199 it offers a cheap initial outlay, which offsets the slightly more expensive running costs.

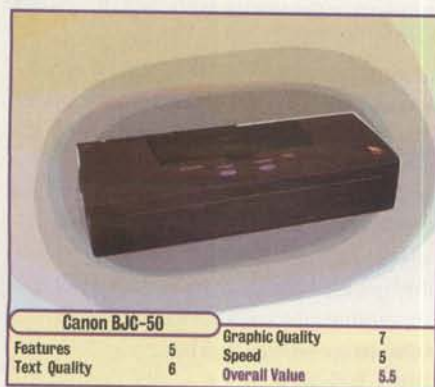
Setup and swapping between black and colour cartridges is simple. When enabled, the printer's automatic detection system correctly matches paper and ink. Unfortunately, there's no automatic cartridge depletion warning, so the unit will continue printing even when one of the ink wells runs out.

Again we found the supplied documentation was of a high quality and easy to follow. In our output tests, the print quality was reasonable throughout. The black cartridge produced very good text that was sharp and accurate. In the graphics tests, however, printouts looked average for a low-end ink jet with text and business graphics. Being a three-colour inkjet, when you swap out the black cartridge and replace it with the colour one, black is created through three passes of colour and the overall graphics effect is dulled considerably.

When we generated photos and blocks of colour, the limitations of the BJC-255SP's



modest 360 x 360dpi resolution became apparent, but it was acceptable considering the context. Even when using the best media and superior printer settings, we clearly saw mot-



BJC-50 is your printer, just keep in mind it only has a single sheet feeder, runs on batteries (or AC power), and has small ink cartridges. The speed is more than acceptable at this price point.

Canon BJC-50. Price \$699 (as tested); Canon Australia; Ph 02 9805 2000, Fax 02 9956 8865; www.canon.com.au

Canon Australia

Canon BJC-80

The Canon BJC-80 is another very small printer indeed, once again catering for people on the move and those in the field, or the student who can't always access

HARDWARE

Inkjet Printers

ting, dot patterns and streaking, and somewhat dull or faded colours. We saw no significant difference in output quality between Photo ink and the less expensive standard colour cartridge, except that the Photo ink output showed reduced contrast when printed on glossy paper.

Throughput testing speed was acceptable for a unit in this class, coming in with a total time of 2509 seconds well over the average of 1930 seconds. If price is paramount, the BJC-255SP may just fill the bill.

Canon BJC-255SP. Price \$199 (as tested); Canon Australia; Ph 02 9805 2000, Fax 02 9956 8865; www.canon.com.au

Canon Australia

Canon BJC-4650

The Canon BJC-4650 builds on the features of the now discontinued BJC-4300 by handling up to A3 and offering Mac compatibility. The maximum resolution is 720 x 360dpi and output on plain paper is very good, with strong black characters (very little wicking or blurring). The resulting sharpness meaning that it matched the best printers in this group.

Canon's driver software is easy to install and use, and provides a good selection of con-



trols for adjusting output quality. The printer has just two buttons on its control panel, Power On/Off and Pause/Resume. This is one of the few printers to include Macintosh drivers and interface as standard, but the lack of network option means it can't be shared in a mixed environment.

The results with our Photographic test images were poor when printing on plain paper, with red coming through quite noticeably. The BJC-4650 produced sharp images with clear detail, but there was a pronounced grainy quality, as well as some banding on

large areas of solid colour.

On large print jobs we noticed that graphics test pages became damp and tended to curl up as the inks dried. A waterproof black ink, such as that offered by Lexmark, might improve this problem on plain paper. We noticed an improvement in quality when printing on coated paper, as Canon provides a different set of inks for printing on this paper. Its BC-22 Photo Kit contains a single four-colour ink cartridge designed for these high-quality papers, and it makes a substantial difference to the appearance of output.

A small amount of banding remained when using the Photo Kit inks on coated paper, but the graininess that was present on plain paper became far less obvious. Using glossy paper produced even better results, although the printer did seem to lose a little subtlety on graduated colours. Nonetheless, when using these high-quality papers, our judging panel felt that this was one of the few printers that came close to the quality of Epson's printers.

Canon's warranty on this printer is for 12 months with an optional three years offered if required. The BJC-4650 has a lot going for it, with quality on more expensive papers very good indeed, but potential buyers should take the time to examine its output on plain paper to ensure that it fully meets their needs.

Canon BJC-4650. Price \$499 (as tested); Canon Australia; Ph 02 9805 2000, Fax 02 9956 8865; www.canon.com.au

Canon Australia

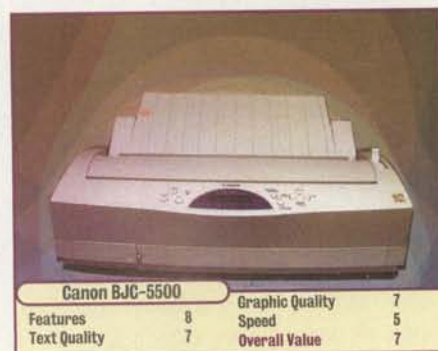
Canon BJC-5500

This is Canon's answer to all your business printing needs, and like HP's 1120C, the BJC-5500 offers printing on A3, A4, Cut-Sheet and tractor feed paper. With a large duty cycle and reasonable print quality it is designed for a business that requires regular printing on multiple forms, without the need to go to too much trouble.

The BJC-5500 ships without the cut-sheet feeders you will ultimately need for printing on A4, so in essence the out of box configuration is a little limiting, but once configured you have access to a large number of printing options. We ran our quality and speed tests using the supplied cut-sheet bin, which was very easy to install and use. Each cut-sheet bin has a 100-page capacity; with both in-

stalled, the capacity rivals the HP 2000CN included an additional paper tray that matched it.

Speed was just on the average with a total time of 2027 seconds, but still well behind its main rival the HP 1120C which had a time of 1580. The BJC-5500 is a very quiet printer and comes standard with two print heads. One is the high speed BC-20 black ink cartridge with 128 print nozzles. Automatic text smoothing gives your documents a very good finish that was still not in the same class



as the HP or Lexmark printers. The other standard ink cartridge with the BJC-5500 is the four-colour (CMYK) BC-21.

Printer drivers are available for DOS, Windows 3.1x/95/98 and Windows NT, and a serial interface option is also available. The BJC-5500 will also accept a variety of presets for pitch and character for those who wish to use it as a dedicated printer for large spreadsheets. We found the BJC-5500 a solidly reliable printer. The only issue we had with a printer destined for a business environment is that its speed may be a bit of a letdown.

Canon BJC-5500. Price \$1499 (as tested); Canon Australia; Ph: 02 9805 2000, Fax: 02 9956 8865; www.canon.com.au

Canon Australia

Canon BJC-7000

Canon's higher-end BJC-7000, targeted at business and graphics professionals, showcases new technologies for improving graphics output. For openers, the printer is the only seven-colour ink jet on the market. It prints in CMYK as well as in lighter hues of the primary colours, which Canon claims gives it more accurate colours and finer gradients. The wider head swathe allows for edge-to-edge A4 printing. It even has what Canon calls P-POP, or Plain-Paper Op-

timized Printing, an instant-dry coating that prevents inks from spreading and bleeding when applied to plain paper, and that also makes them waterproof.

The evidence for this was quite apparent, with the black ink very black indeed, and our ink draining exercise showed that despite 100-percent coverage the paper did not curl or seem overly damp, unlike the majority of other printers.

The software driver's interface is comprehensive but not complicated, and it gives users the choice of accepting a wide variety of presets or creating user-definable settings. Its colour-management system can match printer output to scanner or digital camera input and to the monitor display.

Quality overall was quite good, but less than we expected for all technology included. Text was a bit fuzzy and wicking was noticeable. With the BJC-7000, Canon seems to

considered, Canon have a good base to work from to launch an attack on the Epson Stylus 740 and Stylus 850, but a little more work is required.

Canon BJC-7000. Price \$499 (as tested); Canon Australia; Ph: 02 9805 2000, Fax: 02 9956 8865; www.canon.com.au

Peripheral Sources International

CD Solutions

The CD Solutions printer is really a Canon BJC-7000 that is designed to print directly onto CDs, rather than printing onto a label you then stick over the CD. (If you want to see what else this printer can do please read the BJC-7000 write up, but the focus of this review is the additional features of the CD Solutions printer.)

In order to allow printing onto a CD surface CD Solutions has modified the BJC-7000 with a rear-feeding tray. The CD slips into the centre of the tray, which positions the CD for accurate printing. Also supplied is a template for use within CorelDraw, which essentially gives you a guide as to where to position your graphic and how large an area you have to work with.

The installation of the printer was not difficult, with the template opening under CorelDraw8 with no difficulty. We put together a quick title and some graphics, and

can print the front cover of the CD package as well.

If printing CD faces and covers is only a part time occupation rest assured that the remainder of the printer works as any other BJC-7000. It printed A4 pages with the same quality and speed of the of the BJC-7000 already reviewed. With CD burners how fairly common, it is nice to know that someone has thought of an even simpler way to print a pleasing cover for the myriad of backup CDs that now exist.

CD Solutions. Price \$1995 (as tested). Peripherals Sources International; Ph: 03 9878 8611, Fax: 03 9878 8090; www.psiaust.com

Epson Australia

Epson Stylus 440

The Stylus 440, 640 and 740 printers are the latest from Epson. While the Epson Stylus 440 is no speed king we found it robust, well priced, and it offers one of the best cartridge life expectancy rating of all the printers reviewed. The package comes with good printer drivers and Epson's new status monitor that alerts you to the printer's condition.

With a maximum resolution of 720 x 720dpi the printer offers more than enough resolution for most home and small business tasks, just be aware that the jump in print quality will extend print times significantly.

Printer setup was completed quickly and without fuss, and with Epson offering all their drivers on CD, this part of the installation was easy as well. It is obvious how much time Epson software developers have put into their drivers with clear



have solved the reddish tinge to graphics, but in some cases the adjustment seems to have gone too far with skin tones tending to look slightly washed out.

It would seem that certain trade-offs are a necessary evil in computing with the BJC-7000 being one of the slower printers, even at normal resolutions, than the large number of competitors. With an overall time of 2964 seconds for all the tests it finished well over the average of 1930. The time blow-out came specifically in the graphics tests with the BJC-7000 slowing significantly, taking 238 seconds for a test that took the HP 2000CN only 20 seconds. Text speed was much improved, but still set no records.

There is much to like about the BJC-7000, with a reasonable price of \$499 and its solid reliability and robustness. The ink cartridges are the biggest we saw, although they didn't last the longest, but proved themselves good stayers in the cartridge drain test. All things



were pleasantly surprised with the results. On one of the 50 silver topped CDs that come with the CD Solutions pack we found the printed results were vivid, clear and good look at. Printing time varies from a few minutes to ten minutes for large bitmapped graphics, but it's a more than acceptable wait considering the result. Some of the other supplied CD cover examples showed off the CD Solutions real capabilities. Also in the pack are jewel case covers so that you



easy to read tabs making for very easy adjustment to settings.

How We Tested—Inkjet Printers

We tested the printers as "local" standalones, connected to LPT1. Our test platform was a Packard Bell 200MHz with 64MB of RAM, a Quantum Fireball hard drive and a Diamond Stealth 3D PCI graphics accelerator running Windows 98. These printers are perfectly suited for home and small office usage and the tests were designed appropriately.

For our local LPT1 tests we paused the printer in Print Manager (settings are left at their default), and allowed the application on test to completely spool the print job to Print Manager. We then resumed Printer Manager and timed the entire print job from the moment we un-pause Print Manager to the output of the final page. We use this test method to provide an indication of the printer's speed without the test PC factoring heavily in the results. The time was taken at three points: first sign of activity at the printer, first page fully delivered into output tray, and last page fully delivered into output tray.

Two Windows applications were used during testing: Word for Windows and Paint Shop Pro version 5.

Three test files developed by the Lab were used during the course of testing: (1) a single font and simple format 10-page Word for Windows document, (2) a complex 4-page document

with multiple fonts, colours, styles, column formats and many embedded TIFs and clip art and (3) a composite TIFF image of a landscape with an embedded image of a sleeping baby and a macro shot of a flower.

The 10-page document is printed to determine the printer's peak page per minute output and tests are carried out in "Normal Quality" modes. We measured the time the printer takes to produce the first page and the last page then divide the time between first and last pages by 9 to obtain the peak pages per minute. The Complex document test is only carried out in the printers "High Quality mode" and it allows us to assess skin tones and colour fidelity and also measures the printer's performance with full-page graphic images.

Printed output was assessed for quality by a panel of our lab technicians, both with the naked eye, and also using an 8X magnifying loupe. Colour purity was also judged with the naked eye, assessing how close the output was to actual screen colours. While we acknowledge this is a largely subjective measurement, especially given the different technologies (screen colour is an additive process, whereas printer colour is subtractive), we feel that most users would use similar colour purity criteria.

Like the Canon, Lexmark and HP products, Epson supplies good documentation with each printer, although the newest arrivals only come with manuals that just get you going, leaving out much of the technical information that the others include. A user guide is also on the supplied CD.

Those seeking even better quality will be pleased that Epson has included some bonus paper in the box, so that you can see for yourself what a difference it makes to the quality of output.

While the majority of printed output from the Epson Stylus 440 was good, a reddish tinge was evident in graphics on plain paper. This disappeared when printing on higher quality paper and this ultimately turned out to be the only complaint we had of the output. Greyscales were handled well, and vibrancy on glossy paper was excellent.

On our Font key page, text was clear even down to 4 point, but it was getting a little ragged. Print times were nothing startling, with the Stylus 440 finishing just under the average of 1930 seconds, with a total time for all tests of 1839 seconds. This time was still better than its main rivals from HP, Lexmark and Canon.

At \$299 you would be hard pressed to

find a better printer that offered as much.

Epson Stylus 440. Price \$299 (as tested), Epson Australia; Ph: 02 9903 9000, Fax: 02 9903 9177; www.epson.com.au

Epson Australia

Epson Stylus 640

There is little to differentiate the Epson Stylus 440 and Stylus 640 printers in terms of technology, but the Stylus 640 has received a noticeable speed boost over its little brother. The Stylus 640 maintains the cartridge life expectancy rating of the Stylus 440 (they use the same cartridges) without a quality sacrifice. The maximum resolution of 720 x 720dpi is maintained. Printer setup was completed quickly and without fuss, and with Epson offering all their drivers on CD this part of the installation was easy as well.

The supplied manuals get you going, but leave out much of the technical information. A user guide is also on the supplied CD. This package also includes some bonus paper, so that you can see for yourself what a difference it makes to the quality of output.

In strikingly similar fashion to its little brother, the Epson Stylus 640 produced good results all round, bar the overly red tinge to graphics on plain paper. Similar to

the Stylus 440 and 740 we noticed that when we swapped out the plain paper for coated or glossy this problem disappeared. In terms of performance, the Epson Stylus 640 ranged from 15 to 40 percent faster than the Stylus 440. The speed variance was most noticeable in the 4-page complex Word test,



Epson Stylus 640			
Features	7.5	Graphic Quality	7.5
Text Quality	7	Speed	7
		Overall Value	7.5

with the Stylus 640 taking only 194 seconds to complete the test, versus 317 for the Stylus 440. Where the Epson Stylus 640 was again noticeably more nimble than the Stylus 440 was in High Quality mode, with results in the Paint Shop Pro and ZD Colour key tests confirming this. Overall, the Stylus 640 took 1396 seconds to complete all the tests, with the fastest printer taking 926 seconds. Compared to other printers the Stylus

640 was very strong, easily accounting for its direct competition from Canon, HP and Lexmark with the closest competing printer being the BJC-4300 in a time of 2191 seconds.

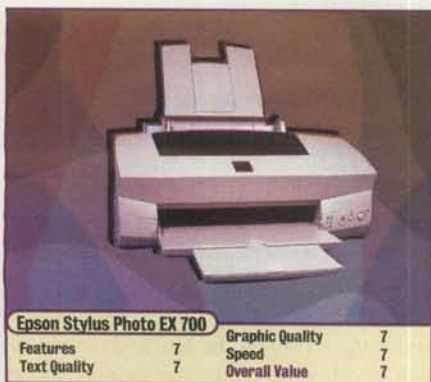
Epson Stylus 640. Price \$399 (as tested); Epson Australia; Ph: 02 9903 9000, Fax: 02 9903 9177; www.epson.com.au

Epson Australia

Epson Stylus Photo EX 700

If the need for near-Photo quality printouts is driving your purchasing decision, then the Epson Stylus Photo is worthy of your attention. The company targets this well-designed printer at business, home, hobbyist and professional users. The Stylus Photo uses six-colour printing and Epson's Micro Piezo technology for added colour gradations and smoothness (it essentially offers all that the Photo EX does, without the A3 capability).

The printer drivers are easy to use, yet allow for sophisticated manipulation. You can adjust everything from colour settings to custom paper sizes. We especially like the VCR-esque print status box, complete with Rewind (reprint), Pause and Stop buttons, which makes it easy to abort midjob, no small feat for most printers. The 700 is both Mac and PC compatible, and can be shared over a network. Of course, at such slow speeds, you probably won't want to.



The Epson Stylus Photo 700 scored two third placings in the speed tests, really shining when it came to printing graphics. Good black text and rich colour graphics were hallmarks of this printer, but of course the best use for this printer is Photographic image printing. Close examination showed very good print quality on special ink jet paper, and stunning photo printing on glossy photo

paper. Text didn't fare quite as well as graphics. On plain paper, characters suffered jaggy edges.

There is no question that the 700 is really built for photo printing, not speed. The software bundle includes Adobe PhotoDeluxe, a simple Photo editing application, and some of Epson's Photo paper for seeing yourself how good the quality really is. With good manuals and Epson's Print Adventure software for the creation of cards and the like, you are getting a very good bundle indeed.

The Epson's price becomes even more attractive considering that the cost per page works out to a low five cents for black-and-white and 22 cents for colour. Unfortunately, middling text quality and sluggish print speeds keep the 700 out of the inkjet big league. But if you plan to print mostly graphics and digital Photos, the Stylus Photo 700 will have you laughing all the way to the family reunion.

Epson Stylus Photo 700 EX. Price \$499 (as tested), Epson Australia; Ph: 02 9903 9000, Fax: 02 9903 9177; www.epson.com.au

Epson Australia

Epson Stylus 740

The Epson Stylus 740 proved to be the printer to beat in terms of speed, putting pay to all other printers reviewed with only the Epson Stylus 850 and HP 2000CN offering any resistance. Like the Stylus 440 and Stylus 640, the 740 suffered from an overly red tinge in graphics on plain paper, but its quality on glossy and high-resolution paper was excellent.

The black print head used in the Stylus 740, using the new piezoelectric technology, now has 144 nozzles for ultra sharp black. Unfortunately the extra nozzles are wasted on plain paper, as it cannot deal with the extra ink being supplied. On better paper however, the Epson Stylus 740 ranks alongside the Lexmark OptraC 45 in text quality, with a near laser-like appearance. In improving the cartridge for the Stylus 740 Epson has also managed to include a little more ink, which ultimately went on to provide the third best cartridge life expectancy score that we saw. The two printers in front of it were the HP 1120C and HP 720C.

Setting up the printer was a no-brainer and typical of the entire Epson range. We

were hoping with this new printer for a significant reduction in the time it takes to prime the cartridges for printing, but from our quick tests there is no notable improvement. With the preliminaries out of the way we moved onto our tests.

In the ten-page word document the Stylus 740 just missed a top-three placing, but it made amends in the more complex four-page test with a second placing behind the HP 2000CN. This trend continued with top three placings in the remainder of the tests. The blazing speed across the board gave the Epson Stylus 740 the fastest overall score with a total time of 926 seconds, well below the 1930 second average.

The text quality was similar to the other Epson printers, with some wicking and fuzziness noticeable on plain paper. This disappeared when using high-resolution paper, but it would seem the HP and Lexmark are still the leaders in text on plain paper. Graphics on plain paper also suffered from the reddish tinge that was exhibited in the printouts from the Stylus 440 and Stylus 640 printers. The tables were turned on glossy paper however, with the Stylus 740 producing very high quality images indeed. Our panel of judges found that the Stylus 740 was one of the best printers on glossy paper, ultimately producing some of the most pleasant looking images of any of the units tested.

Without a doubt the Epson Stylus 740 represents printer technology that is pushing the boundaries and providing customers with the quality, speed and reliability they now expect and deserve. The \$599 price tag is a little more than some of the competition, but the majority of other printers simply can't match the speed, quality and running costs of the Epson Stylus 740.

Epson Stylus 740. Price \$599 (as tested).



HARDWARE

Inkjet Printers

Epson Australia; Ph: 02 9903 9000, Fax: 02 9903 9177; www.epson.com.au

Epson Australia

Epson Stylus 850

The \$799 Epson Stylus Colour 850 nips at the heels of the fastest ink jet in this roundup, the Epson Stylus 740, but it does cost \$200 more. The Epson Stylus 850 has a features set no greater than that of its little brother the Stylus 740, and on the face of it it would seem the Epson Stylus 850 has been upstaged. The quality is very similar and so is the speed, but the running cost are higher based on our tests, making the choice to buy the Stylus 850 even more difficult.

The Epson 850 was clocked at 3.3ppm in our tests using its normal print mode. Other results were also very good with the Stylus 850 never dropping out of the top three places. With a good turn of speed the Epson 850 may suit environments that demand fast



turnaround, but output quality was middling on plain paper, though it improved on Epson's coated inkjet paper. On plain paper, characters looked blurry around the edges, as if the ink had been overabsorbed. On inkjet paper, characters appeared crisp and very black, but closer inspection revealed visibly jagged edges at standard point sizes. Graphics printed on plain paper showed obvious dithering, but ink jet paper more or less took care of that, though we'd choose the Epson 740 over the 850 for graphics any day.

Cost per page is negligible: six cents for black, well above the new 440, 640 and 740 printers, and a slightly below average 20 cents for colour. The printer's drivers are simple to use, yet allow for sophisticated manipulations, such as adjusting colour levels, saving custom settings, and using custom paper sizes.

Like some of the other printers the 850 can be simultaneously hooked up to a PC and a Mac and can switch automatically between the two.

The Epson 850 may be fast, but its print quality lags. It'd be difficult to recommend this printer when others in its own camp delivered both similar speed and quality at a more reasonable price, but it is certainly speedy and aimed at producing a large number of pages for a small to medium sized business.

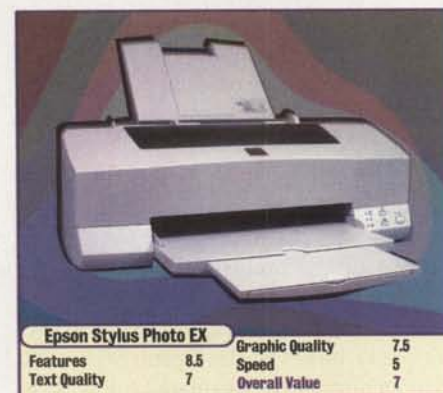
Epson Stylus 850. Price \$799 (as tested), Epson Australia; Ph: 02 9903 9000, Fax: 02 9903 9177; www.epson.com.au

Epson Australia

Epson Stylus Photo EX

A perfect colour photo-printing solution for amateur and professional photographers, graphic designers and in-house publishers, the Stylus Photo EX uses the very latest technology to produce the ultimate in true photo-quality output up to A3 size.

Equipped with Epson's Photo Reproduction Quality technology (PRQ), it provides the complete colour Photo printing solution without the need for optional kits or special inks. The Stylus Photo EX supports both Windows and Mac colour



matching systems, which together with Epson's PhotoEnhance 2 ensures that colour Photographs are optimised for colour and exposure values.

With ink cartridges priced at \$33 and \$39 dollars it's cheap to run; thankfully, considering the amount of ink that is consumed when printing full A4 pages. We discovered some slight horizontal banding in a few of the images that we printed, that were real-

ly noticeable in blue sky, but not so much in other areas. Speed is also a handy feature of this printer, except in straight text where the Photo EX really took a hammering. Introduce graphics however, and the printer really starts to fire, producing pages as quickly as the some printers.

As we said our only grumble was the banding, but the Photo EX, with its ability to print on A3 with such high quality, is something that will appeal to certain specific applications. Unfortunately this all comes as a price of \$899, that will be difficult for some to overcome, but if you need excellent graphics print quality on large sheets, or small for that matter, this is one printer you cannot overlook.

Epson Stylus Photo EX. Price \$899 (as tested), Epson Australia; Ph: 02 9903 9000, Fax: 02 9903 9177; www.epson.com.au

Hewlett-Packard Australia

HP DeskJet 670C

The DeskJet 670C is Hewlett-Packard's least expensive (\$282) four-colour printer. Targeted at home users, it's a great deal for those who want colour output but don't intend to print photos, although it doesn't do a bad job at printing those as well. Operating costs are good, with costs of five cents per page at five percent black coverage and 17 cents for 15 percent colour coverage.

Setting up a HP printer is as simple as those from any of the other vendors, with Windows 98 detecting the printer and asking for the driver, which is driver supplied on three 3.5in disks. One immediate difference between the HP DeskJet printer range and the other printers reviewed is their methods of paper handling. HP use a curved paper path in the 670C, 695C and HP2000CN, which allows the paper input and output trays to be stacked on top of one another, keeping the printer more compact. The other unique trick that HP employs in this style of paper handling is that each page is dropped to a holding bay for drying, while the next page is being printed, to prevent smudging.

HP has always managed to maintain a high quality of text printing on plain paper and the HP DeskJet 670C doesn't let the side down. Text was sharp and noticeably blacker than that of the Canon and Epson

units. Graphics were also bright and visually pleasing, but the resolution of the printer was not enough to smooth out the images, giving them a grainy look.

Output samples of graphics also showed much darker blacks, which were sometimes too overpowering, and richer colours than many of the other printers.

Speed is where the HP DeskJet 670C tended to lose ground, with a total test score of 2417 seconds, compared to the average of 1930 seconds. Nevertheless, inkjets are about compromise, and what you lose in the speed stakes is made up for in the quality of text output. Although the



DeskJet 670C may not generate ideal colour output, its target audience isn't in the high-end photo market and therefore it makes a good buy for budget-conscious families.

HP DeskJet 670C. Price \$282 (as tested); Hewlett-Packard Australia; Ph: 13 13 47; Fax: 03 9899 5824; www.hp.com.au

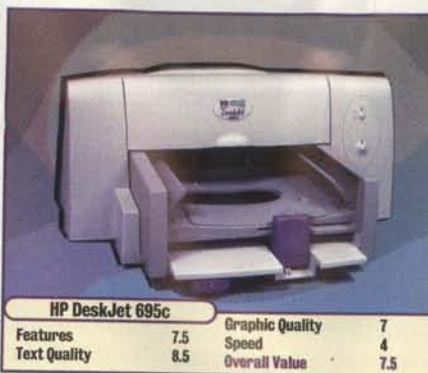
Hewlett-Packard Australia

HP DeskJet 695C

The HP DeskJet 695C raises the bar a little over the 670C by adding a Photo Ink cartridge for very appealing photo quality output, while maintaining the rich black text of the HP DeskJet 670C displayed. For families that intend to print photos occasionally and are willing to pay for another notch in print quality, the 695C is a great value package.

Priced at \$335, the 695C also gets an increase in graphics resolution over the 670C, up from 300 x 300 on plain paper to 600 x 300. This helped produce better quality graphics all round, but did not produce noticeably better text, which was excellent nonetheless. Three ink cartridges come

standard with the printer: monochrome, colour and the special Photo Ink. The photo cartridge needs to be swapped in as



required, but this is not difficult and the alignment procedures are easy enough to follow.

The set up and subsequent use of the printer is well detailed in the supplied manual, with technical support available during business hours if you need it. We found the cartridge life of all the HP models to be excellent, so the additional cost is justified considering the extra pages that can be printed from each cartridge.

As previously mentioned, this model's greatest visible benefit was in printing photos, especially on the special photo paper, where the extra colour blending added realism. Scores on our speed tests were on a par with other printers, but still not in the same league as the Epson printers.

Remember however, that the compromise in speed is superior text when printing at normal resolution settings. The 695C's features are a welcome step up from the 670C; it is a well-tailored device for family-oriented users, and one of the recommended printers of this review.

HP DeskJet 695C. Price \$335 (as tested); Hewlett-Packard Australia; Ph: 13 13 47; Fax: 03 9899 5824; www.hp.com.au

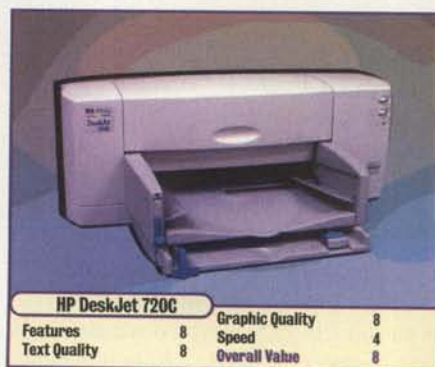
Hewlett-Packard Australia

HP DeskJet 720C

The HP DeskJet 720C is a real technological showcase in HP's home-oriented product line, and in combination with quality output and speed helped it gain a Merit Award. It brings several new technologies, some of which were developed in conjunction with other major companies, to this market for the first time. HP

has gone on to use similar technology in other printers, like the HP2000CN, but offering them in a low end unit is welcome indeed. In terms of quality and cartridge longevity, this model will certainly exceed many of the expectations of general home users.

The 720C uses newly designed colour cartridges with PhotoREt II, a technology that helps produce more ink drops per pixel in a single pass. It also includes ColourSmart II, which incorporates three



new technologies to optimise colour printing further. These include RGB, a colour-matching standard co-developed with Microsoft; Intel MMX driver support for faster processing; and SmartFocus to improve low-resolution images from the Internet. The printer also uses a Kodak Image Enhancement (KIE) driver to create breathtakingly clear Photo images on HP's new Deluxe Photo Paper, which did not use for our evaluation.

In subjective quality testing, the 720C produced rich, vivid, consistent colours that were clearly a big step up from the DeskJet 695C in all print modes. Photos on the special Photo paper were stunning, but slightly dark in places. Printer speed testing was fast in Microsoft Word but slower in other applications, with an overall score of 2333 seconds, just over the average of 1930. This puts it ahead of the HP DeskJet 670C, but behind the HP DeskJet 695C.

In our ink cartridge drain test the HP 720C was first in the black test with 119 pages, but like the other HP printers this dropped to 55 pages in the colour test. Nevertheless if you are budget conscious and your looking for a home printer with great features and outstanding photo output, this is one to consider.

HP DeskJet 720C. Price \$515 (as tested);

Hewlett-Packard Australia: Ph: 13 13 47;
Fax: 03 9899 5824; www.hp.com.au

Hewlett-Packard Australia

HP DeskJet 1120C

The HP DeskJet 1120C is an evolutionary improvement over the 1000C series printer that it replaces. The tabloid-capacity (A3) printer incorporates HP's stunning PhotoREt II technology for improved graphic output. This printer, like the Canon BJC-5500, is designed to deliver large numbers of pages, with low cost and high reliability.

The key to PhotoREt II technology is its ability to place up to 16 drops of ink per dot location, which makes it possible to create more shades of colour, no matter what type of paper you use. The printer uses a single black ink cartridge and a single multicolour cartridge that contains the cyan, magenta and yellow inks. Using black ink, the printer can handle up to 600dpi resolution in its best-quality print mode. Without magnification, even the normal mode (300dpi) on photocopier-grade paper is indistinguish-

able from laser printer output. An EconoMode setting saves ink and shortens print times. The printer driver uses HP's ColourSmart II technology to distinguish automatically between text and graphics—even on the same page—and uses appropriate print settings for each area.

The printer works with both DOS and Windows applications. Under DOS, it is PCL 3-compatible and comes with a configuration utility. The Windows driver supports Windows 3.1x, Windows 95/98, and Windows NT 4.0 (we tested the Windows 95/98 version), and offers an attractive range of features, including a zoom setting to enlarge or reduce images. The driver also creates thumbnails, booklets and banners, and has a billboard mode that tiles a page onto multiple sheets of paper.

Installation and configuration is easy. The printer works best with a bidirectional ECP parallel-port connection, so you should use an IEEE 1284-compliant parallel cable. The unit comes with a special power cord, the aforementioned ink cartridges, and the driver CD. The printer has strong paper-handling features. A 150-

sheet input tray can also hold envelopes or cards. A secondary tray can take single sheets or up to 10 sheets of paper. And a rear-feed slot provides a straight-through paper path for stiff stock. The printer also handles transparencies, HP's new photo paper and labels. HP also offers optional JetDirect print servers so you can attach the printer directly to a network if you choose.

In our tests, the printer was relatively



fast, with excellent output quality. In our Word speed test the printer came in second behind the blazing HP 2000CN, and averaged nearly four pages a minute. Printing in

Editors' Choice

- *Overall:* Epson Stylus 740
- *Best for Business:* HP DeskJet 1120C
- *Best for Home:* HP DeskJet 695C



Deciding on an Editors' Choice was made difficult this month by the large number of printers

reviewed, and the quality they showed. On that basis we felt it necessary to have an overall Editors' Choice, and "Best for Home" and "Best for Business" Merit Awards as well.

After review by the entire Lab staff, the consensus was to award the new Epson Stylus 740 our Editors' Choice. Its qualities include high speed, good text, excellent colour and its ink cartridges are among the best in terms of their longevity. With a price of \$599 it represents excellent value for money. A close second in the decision for the top award was the HP DeskJet 720C, with excellent text, good graphics, fantastic ink life and a very reasonable price of \$515. The only consideration that kept the HP 720C out of the top spot was its much slower performance, but overall it represents an excellent buy.

The "Best for Business" Merit Award goes to the HP DeskJet 1120C, which performed very well in our tests, was fast

and produced excellent text and graphics. Its cartridges were also among the best, which in combination with multiple paper inputs and its handling of a large number of paper sizes was enough to give it the edge. Its price was also very attractive at \$949. The runner up in the "Best for Business" goes to the Canon BJC-5500.

The "Best for Home" award was very close with three main contenders the Lexmark 5000 Jetprinter Colour, Epson Stylus 640 and HP DeskJet 695C. Each printer has its merits with the Lexmark printer producing excellent text and solid colour printouts. The Epson Stylus 640 lost a little on text, but graphics are spot on and very vivid. The HP DeskJet 695C offers very good text, good graphics, long lasting cartridges, great output on plain paper and comes with a very attractive price of just \$335. On that note we decided the HP DeskJet 695C was our "Best for Home" inkjet printer. One point worth remembering is that each of these printers has a number of strong selling points, that may suit your circumstances even better than we can match them up in our three awards. So our advice is to choose carefully and we feel you should get good value out of any of the printers reviewed here.

Megapixel Cameras

colour did slow the 1120C, but with a total time of 1580 it was still better than the average total time. The results could be mistaken for photographs, though there was some faint banding in the darker areas of the image, but it was pleasing that someone could match the excellent photo quality of the Epson units.

The HP DeskJet 1120C is a workhorse printer that will work as well for printing letters and reports as it will for producing full-colour graphics. Its ability to print on tabloid-size pages makes it versatile and efficient in the workplace.

HP DeskJet 1120C. Price \$949 (as tested); Hewlett-Packard Australia; Ph: 13 13 47; Fax: 03 9899 5824; www.hp.com.au

Hewlett-Packard Australia

HP 2000CN

Supporting a brand new design (this model should be announced just as this issue hits the newsstands) that some liked and others called "interesting", the 2000CN also features a new engine for speed and quality that matches the Epson Stylus 740.

The HP2000CN delivers about as much new technology as is possible in a given printer, though it does bounce up the price in the process. Print heads and cartridges have been separated, and require individual installation—nothing difficult, just different.

Good manuals and the quick set up guide were enough to get us under way in ten minutes. Ink consumption is reputedly very low, but we were unable to complete our ink drain tests due to a technical hitch. All in all, this printer is the clear technology winner of this review, but with a starting price of around \$1400, and some poor results in graphics on plain paper, it didn't quite make our Editors' Choice.

The HP2000CN comes with a JetDirect interface for attaching the printer to a network, as it is obviously a very capable printer in a LAN environment. Paper handling is via the in built cut-sheet tray or via the supplied cut-sheet tray that supplements the built in tray.

Given that we had some trouble feeding glossy paper a direct paper path option would be useful however. The cut-sheet tray has a capacity of 250 sheets, which

bumps the total input capacity up to 400 sheets.

Text quality on plain paper and coated ink jet paper was excellent, tying with the Lexmark Optra C45 for the best quality text overall. For colour graphics on plain paper, the HP produced very good results, but still a measure off the best with poor showing in the Photoshop tests. This improved when printing graphics on coated inkjet paper to the level of the 1120C and Epson's printers, and was very appealing overall.

There is little doubt that some of the features of this printer will become the standard by which others are judged, but the initial cost of \$2328 is expensive. The printer will come in two versions the HP2000C, which will be \$1419, but it loses the additional paper tray and JetDirect interface of the HP2000CN.

In summary the HP 2000CN's fast print-



ing and low total cost of ownership are the sort of qualities that will make it a favourite in the small to medium-sized business market. But little grumbles including inconsistent output quality, and the high price tag are possibly going to make it a harder sell than it would be otherwise. With some inevitable smoothing HP are likely to have themselves a real winner.

HP DeskJet 2000CN. Price \$2328 (as tested); Hewlett-Packard Australia; Ph: 13 13 47; Fax: 03 9899 5824; www.hp.com.au

Lexmark Australia

Lexmark OptraC 45

This was the only native Postscript printer we saw in this review, and while it did little to endear us with its speed, its text quality was outstanding. This did not translate into the graphics tests that

we ran however, but the quality was certainly good enough at normal (600dpi) resolution. With a price of \$2250 The Lexmark OptraC 45 is a rugged printer designed for high-quality business and office documents.

In its heart lies and Intel 960 RISC processor running at 33MHz, and while this is necessary to crunch through the jobs sent to it there is not enough power to compensate for the Postscript driver.

Where the OptraC 45 made up ground was in its text quality, which was the best of the review. HP was not far behind, but the OptraC 45 really handled our font test exceptionally well, smoothing everything including the four-point text, which was still very readable.

Graphics quality on plain paper was acceptable, and although there was an improvement on glossy and coated paper, it was still well behind the top Epson units and some of the other printers.

The manual is huge and covers almost every conceivable scenario you could dream up, with a good index to help you wade through the material. The drivers and associated software are also some of the best we have seen, with Lexmark supplying its Markvision software, which provides real-time feedback regarding current printer status.

Ink cartridge metaphors are displayed within the driver to show their ink levels,



and an estimate of the printing time is included in the status portion of the driver software.

If you need Postscript and a printer for business-oriented work, the Lexmark OptraC 45 ranks above the HP 1120C and Canon BJC-5500 in terms of features, but its cost may put it too far above them to make it a sure thing.

Megapixel Cameras



Lexmark 5000 Jetprinter			
Features	7	Graphic Quality	7
Text Quality	8.5	Speed	5
		Overall Value	7.5

Lexmark OptraC 45. Price \$2250 (as tested); Lexmark Australia; Ph: 02 9930 3500, Fax: 02 9930 3550; www.lexmark.com

Lexmark Australia

Lexmark 5000 Colour Jetprinter

Aimed at the home and small office environments, the Lexmark 5000 Colour Jetprinter is a very nifty and satisfyingly well-performing little printer. Like the Lexmark 5700 unit the 5000 also uses 3D laser-cut print-cartridge heads, which gives it a top resolution of 1200 x 600 dpi. Priced at \$391 the total Lexmark 5000 package is very compelling indeed.

The Lexmark 5000 Colour Jetprinter includes as standard a black cartridge and a three-colour cartridge, with a photo cartridge available if required. There is little doubt the photo cartridge is worth shelling out for, as it really improves the graphics output quality. Switching the cartridges is very easy with the printer driver guiding you through the process and then finishing with an alignment procedure. The printer status and ink levels are also managed and reported via the printer-control application.

The speed of the Lexmark 5000 Colour Jetprinter is even better than that of its big brother, the 5700, while producing nearly

identical results. The total time taken for all the tests was 1951 seconds, just above the average of 1930—making it competitive when compared to others of similar specification. Our tests showed the Lexmark 5000 was capable of two pages per minute at normal resolution for black and about 1.5 for colour, very similar to the 5700.

The quality of the printouts from the Lexmark 5000 Jetprinter colour were excellent for text, while only average for graphics. Some banding occurred in the colour key test and there was not much improvement when using glossy paper. In fact some of our judges preferred the output on plain paper, which was very good, to that of the glossy citing it “looked more real”. Text quality was again a hallmark of the Lexmark range, with a deep black and well formed text that was very close to laser quality. The cartridges used by the Lexmark 5000 are identical to that of the 5700, with Lexmark quoting a cost of nine cents and 23 cents for black and colour printing respectively.

The Lexmark 5000 Jetprinter Colour

does not include the software that comes with the 5700, and only has a 1200 x 600 resolution compared to the 1200 x 1200 of the 5700, but in all other respects remains the same. At \$391 the Lexmark 5000 Jetprinter colour is a fantastic little deal.

Lexmark 5000 Colour Jetprinter. Price \$391 (as tested); Lexmark Australia; Ph: 02 9930 3500; Fax: 02 9930 3550; www.lexmark.com

Lexmark Australia

Lexmark 5700 Colour Jetprinter

The Lexmark 5700 Colour Jetprinter is also aimed squarely at the mainstream ink jet printer market, and proved an excellent little printer. Using exclusive 3D laser-cut print-cartridge heads, the new system has a top resolution of 1200dpi. The Lexmark 5700 boasts a hefty paper-feed system, class-leading printing speeds, and all-around print quality. It did exhibit some colour issues in our colour key test, but overall we had little in the way of printing issues to single out. When

you add Lexmark's generous bundle of printing software and a 12-month exchange warranty, it is difficult to find a reason not to like this sturdy, all-purpose printer.

The dual-cartridge (one black, the other cyan, yellow and magenta) Jetprinter switches between four-colour CMYK printing for text and graphics and six-colour printing for Photos (when you pop out the black ink cartridge and replace it with the optional black, light-magenta, and light-cyan Photo-ink cartridge. Printer status, ink levels, head alignment and cartridge switching are managed and reported via a printer-control application.

During speed testing with a variety of Windows applications, the 5700 Colour Jetprinter proved to be as fast or faster than

Cartridge Performance

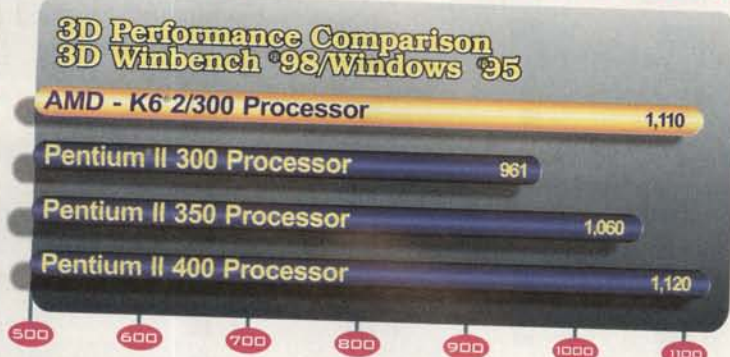
Printer Name	Black Cartridge	Colour Cartridge	No of Black Pages Printed at 15% Coverage	Number of Colour Pages Printed at 100% Coverage
Canon BJC-50	BC-10	-	5	-
Canon BJC-80	BC-10	-	5	-
Canon BJC-50	BC-11	BC-11	3	5
Canon BJC-80	BC-11	BC-11	3	5
Canon BJC-255SP	-	BC-09F	24	22
Canon BJC-255SP	-	BC-05	-	21
Canon BJC-255SP	-	BC-06	-	8
Canon BJC-4650	BC-20	-	46	-
Canon BJC-4650	BC-20	BC-21	16	11
Canon BJC-4650	BC-20	BC-22E	22	7
Canon BJC-7000	BC-60	-	33	-
Canon BJC-7000	BC-60	BCI-62 (Photo)	23	39
Canon BJC-7000	BC-60	BCI-61	46	41
Canon BJC-7000	BC-60	BCI-62	19	17
Epson Stylus 440	S020187	S020191	93	86
Epson Stylus 640	S020187	S020191	93	86
Epson Photo EX 700	S020093	S020110	37	33
Epson Stylus 740	S020191	S020191	99	88
Epson Stylus 850	S020108	S020089	40	36
Epson Stylus Photo EX	S020093	S020110	41	36
HP DeskJet 670	HP51629A	HP51649A	68	58
HP DeskJet 695C	HP51629G	HP51649A	78	62
HP DeskJet 720C	HP51645A	HPC1823A	119	55
HP DeskJet 1120C	HP C1823A	C1823A	109	81
Lexmark 5000	12A1970	12A1980	41	27
Lexmark 5700	12A1970	12A1990 (Photo)	44	37
Lexmark 5700	12A1970	12A1980	55	40
Lexmark OptraC 45	12A1975	12A1985	66	45

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Inkjet Performance

Longer bars indicate better performance.

	10-page Word Text Test (ppm)	4-page Word Complex Test (ppm)	PaintShop Pro—Normal Quality (ppm)	PaintShop Pro—High Quality (ppm)	ZD Colour Key—Normal Quality (ppm)	ZD Colour Key—High Quality (ppm)	ZD Font Key—Normal Quality (ppm)
Canon BJC-50	2.1	0.7	0.7	0.2	0.4	0.1	1.4
Canon BJC-80	2.0	0.7	0.7	0.2	0.2	0.1	1.6
Canon BJC-255SP	2.2	0.3	0.6	0.2	0.3	0.1	1.3
Canon BJC-4300	1.6	0.6	0.5	0.2	0.4	0.1	0.9
Canon BJC-4650	1.7	0.6	0.6	0.2	0.3	0.1	1.1
Canon BJC-5500	1.0	0.6	0.7	0.3	0.4	0.1	1.0
Canon BJC-7000	2.1	0.4	0.3	0.2	0.1	0.1	1.4
CD Solutions BJC-7000	2.1	0.4	0.3	0.2	0.1	0.1	1.4
Epson Stylus Colour 440	1.6	0.8	1.1	0.3	0.6	0.1	1.4
Epson Stylus Colour 640	1.7	1.2	1.4	0.5	0.7	0.2	1.8
Epson Stylus Photo EX 700	1.0	1.0	1.1	0.6	0.6	0.3	1.1
Epson Stylus Colour 740	2.8	1.8	1.8	0.8	1.1	0.5	2.9
Epson Stylus Colour 850	3.3	1.3	2.1	0.8	1.2	0.4	2.4
Epson Stylus Photo EX	1.0	1.0	0.9	0.5	0.5	0.2	1.1
HP DeskJet 670C	2.0	0.5	0.5	0.2	0.3	0.1	1.6
HP DeskJet 695C	2.2	0.5	0.6	0.2	0.3	0.1	1.9
HP DeskJet 720C	1.3	0.4	0.6	0.3	0.2	0.1	1.9
HP DeskJet 1120C	3.8	0.8	0.9	0.2	0.5	0.1	1.9
HP DeskJet 2000CN	5.0	2.3	3.0	0.4	1.1	0.2	3.2
Lexmark 5000	2.1	0.9	0.7	0.4	0.2	0.1	2.2
Lexmark 5700	2.1	0.8	0.6	0.2	0.3	0.1	2.4
Lexmark OptraC 45	1.9	0.5	0.2	0.1	0.2	0.1	1.2
Average	2.1	0.8	0.9	0.3	0.4	0.2	1.6

printers in the same price class from Canon, Epson and HP. It managed a slightly above average total time of 2242 seconds, that makes it competitive, without knocking your socks off. The official rating is a maximum eight pages per minute text and four pages per minute colour printing, with our tests showing more like two pages per minute at normal resolution for black and about 1.5 for colour.

The Jetprinter continues Lexmark's tradition of producing superior black-text print quality with rich colour graphics and good photo-output quality. Only when you look closely at photo print samples will you see minor banding.

This printer does the job for all types of

tasks. We found the cartridges printed a similar number of pages when compared to other printers, but Lexmark could not supply cartridge costs for the cartridges used. Lexmark quote nine cents and 23 cents for black and colour printing, respectively.

The impressive Lexmark Workshop CD-ROM for Photos software bundle may lead you to burn through a great many cartridges. Printing tools, applications, and design aids include 3M's Post-It Notes Design Software; Live Picture's LivePix SE Photo editor; ArcSoft's PhotoImpression, PhotoPrinter and PhotoFantasy packages for editing, printing and enhancing Photographic files. If you're in the market for an all-purpose ink jet printer, the Lexmark 5700 Colour Jetprinter looks



like a very good choice, especially given its \$478 price tag.

Lexmark 5700 Colour Jetprinter. Price \$478 (as tested); Lexmark Australia; Ph. 02 9930 3500, Fax 02 9930 3550; www.lexmark.com

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EPSON STYLUS COLOR 440

Designed as a Windows only printer, the EPSON STYLUS COLOR 440 is ideal for first time users, students and families experimenting with colour. It's an affordable yet extremely versatile four-colour inkjet printer that lets you create colourful greeting cards, invitations, school projects, community newsletters and impressive personal correspondence.

You can even print photos and cartoons onto t-shirts using EPSON's Iron-on Transfer Paper — perfect for creating truly unique birthday and Christmas gifts for friends and family!

Create picture-perfect images and clear sharp text everytime thanks to the high 720x720 dpi resolution and EPSON's PerfectPicture Imaging System. What's more, with EPSON's QuickDry Inks your documents are dry to touch the moment they leave the printer!

The EPSON STYLUS COLOR 440 comes with On-Line documentation on CD-ROM which contains helpful hints and the very latest information on how to get the most from you EPSON colour printer. from basic tips such as setting up your printer and changing ink cartridges, you'll find this CD's clever animation is fun-to-use and easy to understand.

VALUED AT \$299 RRP inc-tax



EPSON STYLUS COLOR 640

Also, designed as a Window only printer, the EPSON STYLUS COLOR 640 is the perfect Photo Quality printer for desktop publishing at home. Whether you're printing a school project, a newsletter, party invitations or images from the web you'll be amazed at the colour capabilities of this printer. What's more Photo Quality output comes standard with the EPSON STYLUS COLOR 640 — there's no need to purchase expensive options or additional photo cartridges. It features true 1440 x 720 dpi resolution and EPSON's exclusive PerfectPicture Imaging System to deliver Photo Quality images and sharp black text with ease. Even when printing 720x720 dpi on plain paper, the EPSON STYLUS COLOR 640 stands heads and shoulders above it's competitors.

VALUED AT \$399 RRP inc-tax

EPSON STYLUS COLOR 740

The new EPSON STYLUS COLOR 740 inkjet printer is designed to give small office and home office customers 1440x720 dpi printing, even on plain paper.

EPSON's new Variable-sized Droplet technology delivers a combination of small, medium and large ink droplets to give customers greater detail and smoother halftones.

The EPSON STYLUS COLOR 740 supports both Windows and Macintosh operating systems and has a parallel, MAC Serial and USB (Universal Serial Bus) ports as standard.

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How to Win:

EPSON are giving away one of each EPSON STYLUS COLOUR 440, 640 and 740 printers. To win, create a promotional headline for the EPSON SYTLUS PRINTER range and fax it to 02 9955 8871 or e-mail pcmag@zdnnet.com.au by November 31st, 1998.

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SUMMARY OF FEATURES

Inkjet Printers

Product Name	Canon BJC-50	Canon BJC-80	Canon BJC-255 SP	Canon BJC-4650	Canon BJC-5500
Distributor	Canon Australia	Canon Australia	Canon Australia	Canon Australia	Canon Australia
Address	1 Thomas Holt Drive North Ryde 2113	1 Thomas Holt Drive North Ryde 2113	1 Thomas Holt Drive North Ryde 2113	1 Thomas Holt Drive North Ryde 2113	1 Thomas Holt Drive North Ryde 2113
Telephone	02 9805 2000	02 9805 2000	02 9805 2000	02 9805 2000	02 9805 2000
Fax	02 9805 0168	02 9805 0168	02 9805 0168	02 9805 0168	02 9805 0168
Web URL	www.canon.com.au	www.canon.com.au	www.canon.com.au	www.canon.com.au	www.canon.com.au
List price (test configuration)	\$699	\$399	\$199	\$499	\$1,499
Dimensions (HWD, in mm)	49 x 302 x 112.5	57 x 300 x 157.6	176 x 347 x 208	216 x 447 x 253	196 x 600 x 364
Weight (kg)	.9 (including battery)	1.4	2.6	4.3	9.7, 1.9 (Bin one)
Rated monochrome/colour speed (ppm)	Black: 5.5ppm; Colour: Fine, 0.26ppm; HQ mode, 1.8ppm; HS mode, 2.1ppm	Black: 5ppm Colour (HS mode), 2ppm	Black: 3.4ppm Colour: 0.23-0.62ppm	Black: 4.5ppm Colour: 2ppm	Black: 7ppm Colour: 0.3-0.8ppm at full coverage
Print process	Bubble Jet	Bubble Jet	Bubble Jet	Bubble Jet Ink on-demand	Bubble Jet Ink on-demand
Number of black/colour jets either (B/C/M/Y), or (C/M/Y)	BC-10: 128/24/24/24 BC-10: 128/24/24/24	BC-10: 128/24/24/24 BC-10: 128/24/24/24	BC-03: 64/16/16/16 BC-06 PhotoBC-09F*	BC-20: 128 nozzles BC-21e: 64/24/24/24 BC-21: 64/24/24/24	BC-20: 128 BC-21: 64/24/24/24
Maximum monochrome resolution (dpi)	720 x 360	720 x 360	720 x 360	720 x 360 with BC-20 cartridge	720 x 360
Maximum colour graphics resolution (dpi)	720 x 360	720 x 360	360 x 360	720 x 360	720 x 360
Cache size in KB	34	34	40 Input, or mix	64 Input, 32 Download	64 Input, 32 Download
Parallel port/serial port	Parallel or IrDA	Parallel or IrDA	Parallel	Parallel/ Apple RS-422 serial	Parallel
Printer description language	LQ-510 mode (Epson), Proprietary X24E mode (IBM), Canon extended mode	LQ-510 mode (Epson), Proprietary X24E mode (IBM), Canon extended mode	LQ-2550 mode (Epson), Proprietary 24E Mode (IBM), Canon extended mode	LQ-2550 mode (Epson), Proprietary X24E mode (IBM), Canon extended mode	LQ-2550 mode (Epson), Proprietary X24E mode (IBM), Canon extended mode
Macintosh-compatible	■	■	■	■	■
Input/output tray capacity (sheets)	Manual feed; opt. sheet feeder	Auto feed; upto 30 sheets	100	100 (A4)/ 50 (A3)	100(A4) Bin 1, 100(A4) Bin 2
Envelope input capacity/heaviest paper	Auto feed 64/105gsm; Manual feed 64/ 550gsm	4/105gsm	10/105gsm	10/ 105gsm	10/ 128 gsm
Prints on card stock/transparencies	■ ■	■ ■	■ ■	■ ■	■ ■
Prints T-shirt transfers	■	■	■	■ ■	■ ■
Prints on legal-size/tabloid-size paper	■ ■	■ ■	■ ■	■ ■	■ ■
Cost of high-capacity black ink cartridge	Pack of 3: \$26; \$12 each	Pack of 3 has a RRP of \$26	\$49	\$58	\$58
Cost of colour cartridge	Pack of 3: \$33; BCI20C (3): \$18	Pack of 3: \$33; BCI20C (3): \$18	\$60	\$44	\$44
Separate cartridge for each colour	■	■	■	■ ■	■ ■
Low-ink/out-of-ink alert	■	■	■	■	■
Stops printing if one colour runs out	■	■	■	■	■
Photo ink available	■	■	■	■	■
Water-/fade-resistant inks	Only on selected media	Only on selected media	Only on selected media	Only on selected media	Only on selected media
Estimated cost per page: 5% black	n/a	n/a	n/a	n/a	n/a
Estimated cost per page: 15% colour	n/a	n/a	n/a	n/a	n/a
Driver for Windows 3.1/95/NT	■ ■ ■ ■ (98 driver on website)	■ ■ ■ ■ (98 driver on website)	■ ■ ■ ■	■ ■ ■ ■ (on website)	■ ■ ■ ■ (Win98 on website)
Driver for OS/2 / Mac OS / Linux	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■
Printer driver utilities/special features	Drop modulation technology Image Optimiser, Infra-red (IrDA) interface, Optional colour scanning	Drop modulation technology Image Optimiser, Infra-red (IrDA) interface, Optional colour scanning	Super economy mode PhotoRealism Image Optimiser	Drop modulation technology PhotoRealism Image Optimiser Optional colour scanning	Versatile paper selection for continuous, cut sheets and up to A2
Application software included	■	■	■	■	■
Toll-free technical support phone line	■	■	■	■	■
Technical-support hours, if any	9am - 6pm M to F	9am - 6pm M to F	9am - 6pm M to F	9am - 6pm M to F	9am - 6pm M to F
Warranty	12 months; optional 3 year	12 months; optional 3 year	12 months; optional 3 year	12 months; optional 3 year	12 months; optional 3 year
Power consumption	3 - 23 Watts	5 - 27 Watts	20 Watts maximum (printing)	4 - 34 Watts	14 - 58 Watts
Included	Black cartridge (BC10), Colour cartridge (BC11e), Ink cartridge storage containers in (SB-10), Lithium Ion battery (LB-50), Universal AC adaptor (AD-3600u), Image Optimiser enhanced printer drivers for Win 3.1/Win95 (Win98/ NT 4.0 on www), BJC-50 User manual	Black cartridge (BC10), Colour cartridge (BC11e), (SB-10) Cartridge storage container, AC adaptor (AD-320), Image Optimiser enhanced printer drivers for Win 3.1/Win95 (Win98/ NT4.0 on www), BJC-80 User manual	High-capacity black ink (BC-03), Colour ink cartridge (BC-05), Printer drivers for Win3.1/ Win95 (Win98/ on www), BJC-255 SP User manual, BJC-255 SP Windows print guide, BJC-255 SP Quick start guide, Cartridge storage	4-colour ink cartridge (BC-21e), 5 sheets of glossy photo paper, BJC-4650 User manual, Mac print guide, Windows print guide, Drivers on 3.5" floppy and CD Cartridge storage container, power cord	High-capacity black ink cartridge, 4-colour ink cartridge, printer drivers for DOS, Win3.1, Win95 (Win98/NT4.0 on www), BJC-5500 User manual, Window print guide power cord, parallel cable

HARDWARE

Inkjet Printers



Canon BJC-7000	Epson Stylus Color 440	Epson Stylus Color 640	Epson Stylus Photo EX 700	Epson Stylus Colour 740	Epson Stylus EX
Canon Australia	Epson Australia	Epson Australia	Epson Australia	Epson Australia	Epson Australia
1 Thomas Holt Drive North Ryde 2113	70 Gibbes Street Chatswood 2067	70 Gibbes Street Chatswood 2067	70 Gibbes Street Chatswood 2067	70 Gibbes Street Chatswood 2067	70 Gibbes Street Chatswood 2067
02 9805 2000 02 9805 0168	02 9903 9000 02 9903 9177	02 9903 9000 02 9903 9177	02 9903 9000 02 9903 9177	02 9903 9000 02 9903 9177	02 9903 9000 02 9903 9177
www.canon.com.au	www.epson.com.au	www.epson.com.au	www.epson.com.au	www.epson.com.au	www.epson.com.au
\$499	\$299	\$399	\$499	\$599	\$899
218 x 467 x 313	429 x 275 x 168	429 x 275 x 168	165 x 429 x 282	429 x 261 x 167	172 x 546 x 262
6.4 (including adaptor)	5.2	5.2	5.2	5.3	7
Black: 4.5ppm Colour (HS mode): 4ppm	Black (Economy): 4ppm Colour (Economy): 2.5ppm	Black (Economy): 5ppm Colour (Economy): 3.5ppm	Black (Economy): 3.2ppm Colour (Economy): 3ppm	Black (Economy): 5ppm Colour (Economy): 3.5ppm	Black (Economy): 3.1ppm Colour (Economy): 3ppm
Bubble Jet Ink on-demand	On-demand inkjet (piezoelectric)	On-demand inkjet (piezoelectric)	On-demand inkjet (piezoelectric)	On-demand inkjet (piezoelectric)	On-demand inkjet
BC-60: 608 nozzles BC-61: 80/80/80 BC-62: C/M/Y/LC/LMLY 80 each	64/31/31/31	64/32/32/32	C/M/Y/LC/LM 32 each	144 /48/48/48	B/C/M/Y/LC/LM, 32 each
1280 x 600	720 x 720	1440 x 720	1440 x 720	1440 x 720	1440 x 720
1200 x 600	720 x 720	1440 x 720	1440 x 720	1440 x 720	1440 x 720
64	10	32	64K	64K	64
Parallel	Parallel	Parallel	Parallel and serial	Parallel, serial and USB	Parallel and serial
Canon extended mode, LQ mode (Epson)	ESC/P2 with expanded raster graphics (Epson)	ESC/P2 with expanded raster graphics (Epson)	ESC/P2 with expanded raster graphics (Epson); Epson Remote Command	ESC/P2 with expanded raster graphics (Epson); Epson Remote Command	ESC/P2 with expanded raster graphics (Epson); Epson Remote Command
■	■	■	■	■	■
130	100/ 30	100/ 30	100/ 30	100/ 30	100/ 30
15/ 550 gsm (manual)	10/90gsm	10/90gsm	10/90gsm	10/90gsm	10/90gsm
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■ Mouse Mat Kits	■	■	■	■	■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
\$79	\$40	\$40	\$40	\$40	\$40
\$49	\$48	\$48	\$48	\$48	\$48
■	■	■	■	■	■
■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
■	■	■	■	■	■
■ BC-62 Photo	n/a	n/a	n/a	n/a	n/a
■	■ ■	■ ■	■ ■	■ ■	■ ■
n/a	7.5 cents	7.5 cents	7.5 cents	5 cents	7.5 cents
n/a	16 cents	17 cents	22 cents	16 cents	22 cents
■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
7-colour second generation PhotoRealismPlain paper optimised printing (PPOP)	Epson Photo Enhance; Reduction/Enlargement and fit-to-page printing; Watermark and Print Layout, On-screen monitor	Epson Photo Enhance; Reduction/Enlargement and fit-to-page printing; Watermark and Print Layout, On-screen monitor	Epson Photo Enhance 2; ACU Photo Half Toning On-screen monitor	Epson Photo Enhance; Reduction/Enlargement and fit-to-page printing; Watermark and Print Layout, on-screen monitor	Epson Photo Enhance 2; ACU Photo Half Toning on-screen monitor
■	■	■	Photo Deluxe v2.0, Print Adventure (Epson)	■	Live Pix (full version)
■	Ph: 1300 361 054	Ph: 1300 361 054	Ph: 1300 361 054	Ph: 1300 361 054	Ph: 1300 361 054
9am - 6pm M to F	8:30am - 6:30pm M to F	8:30am - 6:30pm M to F	8:30am - 6:30pm M to F	8:30am - 6:30pm M to F	8:30am - 6:30pm M to F
12 months; optional 3 year	12 months standard RTB	12 months standard RTB; 2 year extension available	12 months standard RTB; 2 year extension available	12 months standard RTB; 2 year extension available	12 months standard RTB; 2 year extension available
8 - 40 Watts	Approx. 15 Watts	Approx. 15 Watts	Approx. 15 Watts	Approx. 15 Watts	Approx. 15 Watts
Black ink optimiser cartridge (BC-60), PhotoRealism cartridge (BC-62), BJC-7000 User manual, LQ Emulation's software, Windows print guide, Quick start A3 guide, power cord, cartridge storage container (SB-60)	Printed manual and set up guide, Bonus paper pack, power cord, on-line guide (CD-ROM), Drivers on CD	Printed manual and set up guide, Bonus paper pack, Power cord, On-line guide (CD-ROM), Drivers on CD	Epson Print Adventure; Adobe Photo Deluxe 2.0, Printed manual and set up guide, Bonus paper pack, power cord, on-line guide (CD-ROM) Drivers on CD	Printed manual and set up guide, Bonus paper pack, Power cord, On-line guide (CD-ROM), Drivers on CD	LivePix CD-ROM, Printed manual and set up guide, Bonus paper pack, Power cord, On-line guide (CD-ROM), drivers on CD

SUMMARY OF FEATURES

Inkjet Printers



Product Name	Epson Stylus Color 850	HP DeskJet 670C	HP DeskJet 695C	HP DeskJet 720C
Distributor	Epson Australia	Hewlett-Packard Australia	Hewlett-Packard Australia	Hewlett-Packard Australia
Address	70 Gibbs Street Chatswood 2067	31-41 Joseph Street Blackburn 3130	31-41 Joseph Street Blackburn 3130	31-41 Joseph Street Blackburn 3130
Telephone	02 9903 9000	13 13 47	13 13 47	13 13 47
Fax	(02) 9903 9177	03 9899 5824	03 9899 5824	03 9899 5824
Web URL	www.epson.com.au	www.hp.com.au	www.hp.com.au	www.hp.com.au
List Price (test configuration)	\$799	\$282	\$335	\$515
Dimensions (HWD, in mm)	475 x 274 x 177	199 x 436 x 405	199 x 436 x 405	185 x 446 x 355
Weight (kg)	6.5	5.3	5.3	5.5
Rated monochrome/color speed (ppm)	Black (Economy): 8.5 ppm Colour (Economy): 7.5 ppm	Black (Best): 1ppm; (Normal): 2.5; (Econofast): 4ppm; Colour (Best): 0.3ppm; (Normal): 0.75; (Econofast): 1.5	Black (Best): 1 ppm; (Normal): 3ppm; (Econofast): 5ppm; Colour (Best): 0.3 ppm; (Normal): 0.8; (Econofast): 1.7ppm; (Photo): 0.25	Black (Best): 4ppm; (Normal): 5ppm; (Econofast): 8ppm; Colour (Best): 0.2ppm; (Normal): 1.5; (Econofast): 1.5; (Photo): 0.3
Print process	On-demand inkjet	Drop on demand thermal inkjet	Drop on demand thermal inkjet	Drop on demand thermal inkjet
Number of black/colour jets either (B/C/M/Y), or (C/M/Y)	128/64/64/64	48/48/48/48	48/48/48/48	300/64/64/64
Maximum monochrome resolution (dpi)	1440 x 720	600 x 600	600 x 600	600 x 600
Maximum colour graphics resolution (dpi)	1440 x 720	300 x 300 (plain); 600 x 300 (glossy)	600 x 300	600 x 600
Cache size in KB	32	32 receive (512K built in RAM)	32 receive (512 built in RAM)	512 built in RAM
Parallel port/serial port	Parallel and serial (optional Ethernet)	Parallel	Parallel	Parallel
Printer description language	ESC/P2 (Epson); Proprietary X24E mode (IBM)	HP PCL 3	HP PCL 3	HP PPA (Perf. Printing Architecture)
Macintosh-compatible	■	■	■	■
Input/output tray capacity (sheets)	100/ 30	100/ 50	100/ 50	100/ 50
Envelope input capacity/heaviest paper	10/90gsm	20/ 135gsm (up to 200gsm)	20/ 135gsm(paper);200 gsm (envelope)	15/ 200 gsm
Prints on card stock/transparencies	■ ■	■ ■	■ ■	■ ■
Prints T-shirt transfers	■	■ (with HP transfer media)	■ (with HP transfer media)	■ (with HP transfer media)
Prints on legal-size/tabloid-size paper	■ ■	■ ■	■ ■	■ ■
Cost of high-capacity black ink cartridge	\$49	\$62	\$62	\$62
Cost of colour cartridge	\$48	\$64 (tri-chamber cartridge)	\$64	\$64
Separate cartridge for each colour	■	■	■	■
Low-ink/out-of-ink alert	■ ■	■	■	■
Stops printing if one colour runs out	■	■	■	■
Photo ink available	■	■	■ 168 C1816A	■
Water-/fade-resistant inks	■ ■	■	■	■
Estimated cost per page: 5% black	5 cents	5.1 cents	5.1 cents	5.1 cents
Estimated cost per page: 15% colour	16 cents	15 cents	15 cents	14.9 cents
Driver for Windows 3.1/95/NT	■ ■ ■	■ ■ ■ (NT 4 only)	■ ■ ■	■ ■ ■
Driver for OS/2 / Mac OS / Linux	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Printer driver utilities/special features	Epson Photo Enhance 2Fit-to-page printing, Watermark and Print Layout, On-screen monitor	Colour resolution; CRET Technology	CRET, Photo REt 1 (only with photo cartridge)	HP Photo REt II, Smart Focus, MMX enhancements
Application software included	n/a	n/a	n/a	n/a
Toll-free technical support phone line	1300 361 054	n/a	n/a	n/a
Technical-support hours, if any	8:30am - 6:00pm M to F	9am - 5:30pm M to F	9am - 5:30pm M to F	9am - 5:30pm M to F
Warranty	12 months standard RTB; optional 3 year warranty available	12 months	12 months	12 months
Power consumption	Approx. 18 Watts	4.5 to 12 Watts	4.5 to 12 Watts	5 to 30 Watts
Included	Power Cord, Drivers on CD, User guide Set up guide and Bonus paper pack	Driver, Manuals and power cables	HP DeskJet 695C users guide, HP DeskJet 695C Setup guide, AC adaptor, parallel cable, CD and disks (drivers?)*	HP DeskJet 720C User Guide, 7-step simple setup, CD and disk for drivers

HARDWARE

Inkjet Printers



HP Deskjet 1120C	HP Deskjet 2000CN	Lexmark 5000 Jetprinter	Lexmark 5700 Jetprinter	Lexmark OptraC 45
Hewlett-Packard Australia	Hewlett-Packard Australia	Lexmark Australia	Lexmark Australia	Lexmark Australia
31-41 Joseph Street Blackburn 3130	31-41 Joseph Street Blackburn 3130	12A Rodborough Road Frenchs Forest 2086	12A Rodborough Road Frenchs Forest 2086	12A Rodborough Road Frenchs Forest 2086
13 13 47	13 13 47	02 9930 3500	02 9930 3500	02 9930 3500
03 9899 5824	03 9899 5824	02 9930 3550	02 9930 3550	02 9930 3550
www.hp.com.au	www.hp.com.au	www.lexmark.com	www.lexmark.com	www.lexmark.com
\$949	\$2328	\$391	\$478	\$2250
223.5 x 579.1 x 380	432 x 548 x 304	152 x 432 x 203	152 x 432 x 203	247 x 563 x 277
9.4	9.75	4.1	4.1	9.1
Black (Economy): 6.5ppm (letter); 4ppm (A3); Colour (Economy): 4.5ppm (letter); 3ppm (A3)	Black (Economy): 10ppm; (Best): 7ppm; Colour (Economy): 7ppm; (Best): 2ppm	Black (600 x 300): 5ppm; Colour (600 x 300): 2ppm	Black (600 x 300): 8ppm; Colour (600 x 300): 4ppm	Black: 8ppm Quick Print mode; Colour: 4ppm Quick Print mode
Drop on demand thermal inkjet	Drop on demand thermal inkjet	Thermal inkjet	Thermal inkjet	Thermal inkjet
300/64/64/64	304/304/304/304	202/64/64/64	202/66/66/66	202/66/66/66
600 dpi	upto 600 dpi	1200 x 600	1200 x 1200	600 x 600 (1200 IQ)
600 dpi	Photo REt II	1200 x 600	1200 x 1200	600 x 600 (1200 IQ)
64	2000	n/a	n/a	
Centronics parallel, IEEE 1284 compliant	Parallel, IEEE 1284 compliant	Parallel	Parallel	Parallel
HP PCL 3 enhanced	HP PCL 3 enhanced	GDI (Lexmark Printing System)	GDI (Lexmark Printing System)	Postscript 2, PCL5c
■	■	■	■	■
150/ 50	150 (250 max.)/ 75	100/ 25	100/ 25	150/ 50
15/ 90 gsm	70/ 95 gsm	10 / 199gsm	10 / 199gsm	10 / 199gsm
■ ■	■ ■	■ ■	■ ■	■ ■
■ (with HP Iron On Media)	■ (HP Iron-on transfers)	■	■	■
■ ■	■ ■	■ ■	■ ■	■ ■
\$67	\$68	\$59.95	\$59.95	\$80
\$67	\$68	\$64.95	\$64.95	\$88
■	■ (4-C, Y,M,B)	■	■	■
■	■	■ ■	■ ■	■
■	■	■ (can be overridden)	■ (can be overridden)	■ (override driver)
■	■ Photo REt II technology	■	■	■
■	n/a	■ (black only)	■ (black only)	■ (black only)
5.1 cents	4.9 cents	9 cents	9 cents	6.7 cents
4.9 cents	10.3 cents	23 cents	23 cents	15.8 cents
■ ■ ■	■ ■ ■ (also Windows 98)	■ ■ ■	■ ■ ■	■ ■ ■
■ ■ ■	■ ■ ■	■ ■ ■	(OS/2 available on www) ■ ■	■ ■ ■
Photo REt II, Colour Smart II, Zoomsmart	Photo REt II	Multimedia interface visual and audible	Multimedia interface visual and audible	Markvision: status feedback
Corel Print & Photo, House Select V2 for 95/NT, HP Showcase Your Ideas Print Kit	n/a	n/a	Lexmark workshop for photos	n/a
n/a	n/a	1800 674 484	1800 674 484	1800 674 484
9am - 5:30pm M to F	9am - 5:30pm M to F	8:30am - 5:45pm M to F	8:30am - 5:45pm M to F	8:30am - 5:45pm My to F
12 months	12 months	12 month exchange warranty	12 month exchange warranty	12 month RTD
4.4w (idle) 35w (peak)	8w (idle), 20w (avg), 60w (peak)	10w (idle), 15w (avg), 25w(peak)	10w (idle), 15w (avg), 25w(peak)	25w (idle), 40w (op.), 50w (peak)
Monochrome and colour cartridge, power cord, user's guide, starter CD, HP Showcase Your Ideas CD (includes Corel Print and Photo, House Select V2)	Extra 250 sheet paper tray, Jet direct card for networking.	Black and colour cartridges, Accufeed paper handling system, Printer cartridge garage, B1-01 printer cable	Lexmark Workshop CD-ROM including: livepix; Post-it notes; Photoprinter; WebPrinter; PhotoFantasy	

Software



Innovations in desktop
image editing and illus-
tration are expanding
the palette for design
professionals.

By Sally Wiener Grotta
and Daniel Grotta

professional graphics

GRAPHICS SOFTWARE IS ONE OF THE HOTTEST GROWTH AREAS IN computing. Image-editing and illustration programs are now called upon to create projects for a variety of media—from print to the Web, and in a variety of formats—from Web-page buttons to billboards. To meet these challenges, graphics vendors have been expanding their programs' repertoires, adding increased use of image layers, better multiple undos, vastly improved colour management, integrated Web graphics tools and enhancements that boost productivity. Together these developments open up new possibilities for design professionals.

This year's review of professional graphics software covers ten products in two categories: image editing and illustration. To test image-editing software, we looked at three key areas: photo editing, compositing (combining or collaging two or more images) and painting. Our illustration software tests focused on artistic and technical drawing. In addition, in both categories, we tested each program's print and Web output abilities.

Image Editing

Adobe Photoshop 5.0.....	84
Corel Photo-Paint 8.....	85
Painter 5.....	86
Picture Publisher 8.....	89
Wright Design 2.0.....	90

Illustration

Adobe Illustrator 8.0 (beta).....	92
Canvas 5.0.3.....	94
CorelDraw 8.....	95
FreeHand 8.....	96
Editors' Choice.....	83

Colour

Although it sounds like a simple issue, colour can be quite complex. The reason is that different devices, such as scanners, monitors and printers, each have different ways of producing colour, so that what you see on screen is not necessarily what you get in print. To fix this, graphics programs rely on a colour-management system, or CMS. Many programs now integrate support for standard ICC (International Color Consortium) device profiles. The result is more reliable colour.

Web Graphics

As a graphics medium, the Web poses unique demands. Most graphics programs can import and export GIF, JPEG and PNG formats. Other features to look for include the ability to reduce graphics from photo-realistic, 24-bit colour to Web-friendly 8-bit colour and the ability to create image maps.

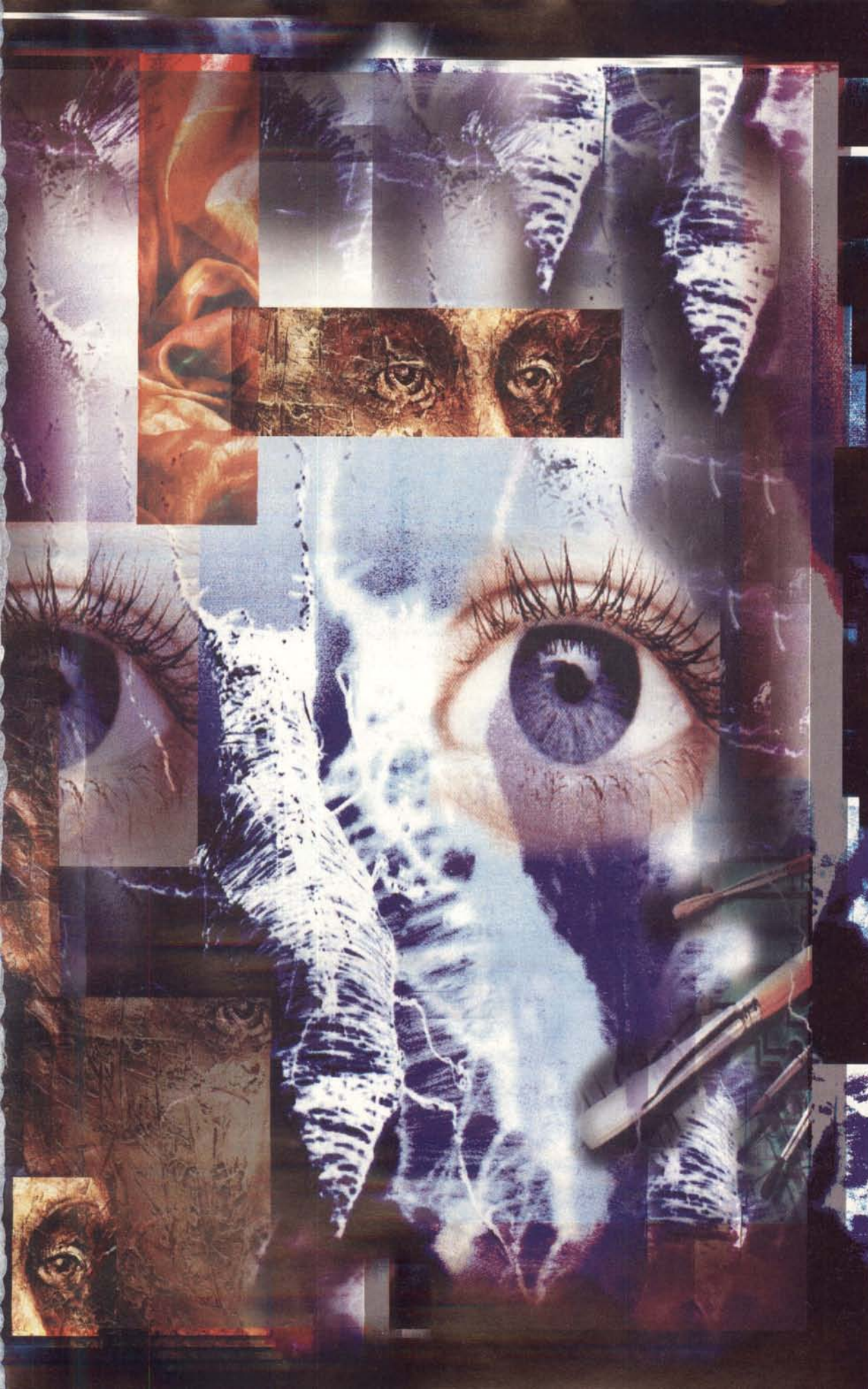
ILLUSTRATIONS BY HYE WON KANG

Layers & Objects

Layers and objects have become standard features in graphics software. The advantage of using layers is that you can combine multiple images and add new elements, such as brushstrokes, to projects without permanently changing the original images. Because objects on layers can be edited or removed, you can experiment freely without fear of ruining an image or losing your work.

Vector Graphics

The forte of illustration packages, vector graphics offer several advantages. First, vector graphics can be magnified or reduced without any loss of detail. Second, they tend to be smaller than bitmap files, so vector graphics are well-suited to the Web.



professional graphics terminology

By Sally Wiener Grotta and Daniel Grotta

Image Editing vs. Illustration

In technical terms, image-editing programs are designed to work primarily with bitmapped images, and illustration programs are designed to handle vector graphics.

A *bitmapped image* (also known as a *raster image*) is made up of an array of thousands or millions of small squares called *pixels*.

Bitmaps are typically used for photographs or painted images. The disadvantages of bitmapped graphics are that (1) they usually require more system resources, and (2) they are resolution-dependent, so that when magnified they appear jagged.

Vector graphics are made up of objects such as shapes, lines and fonts, which are defined mathematically, not by pixels. Vectors are better suited to graphics composed of basic shapes, as in a corporate logo. They tend to be smaller and require less system resources, and they are resolution-independent,



so they can be shrunk or magnified with no loss of detail, as the magnified inset shows.

Selections, Masks and Alpha Channels

One of the more common tasks in an image-editing program is creating a

composition from two or more images. To do this, you need powerful selection and masking tools. A *mask* is used to cover portions of an image so that any changes you make are applied only to the exposed areas. Masks are often saved in an alpha channel, a channel that stores non-colour information about an image.

To create the composite image shown in our first example, we had to cut the man from the original image



and place him in our project. The dotted line that surrounds the man shows the area that has been selected. Image-editing programs include tools for making regularly shaped selections, such as rectangles and ovals and free-form selections using pens and other tools.

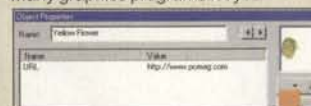


An *alpha channel* is a separate, greyscale channel that is saved with an image's colour channels. (In this example, we are using an RGB image, so the colour channels are red, green and blue.) When you add a mask to an alpha channel, it works like a cardboard stencil that you might place over a picture to outline areas that you want to work on (as shown).

The black and white areas on an alpha-channel mask represent fully opaque and fully transparent areas, respectively, and levels of grey represent varying degrees of translucency. In the next example, we placed a gradient mask that goes from black to white—with greys in between—on the alpha channel of the image of the sky. Then, when we selected the areas that showed through the mask and pasted them onto the image of the bottles, it created a gradual transition from the sky to the bottles.

Web Graphics

Many graphics programs let you



select objects or areas in an image and create hot spots, areas that link to the URL of a Web site. In this example, we used Micrografx's Picture Publisher 8 to select an area of our painting of a flower, opened the Object Properties dialog box, and assigned a URL (www.zdnet.com.au) to that area. When the file containing the URL link is saved, it creates an image map that defines the area of the image that has been assigned as a hot spot. When the file is viewed within a Web browser, the cursor turns into a pointing hand to indicate that you can click on this area to jump to *PC Magazine Australia's* Web site.

Colour Models

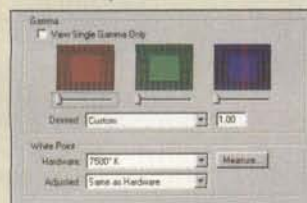
Colour is described in scientific terms by using colour models. In these models, any colour is described as a



mixture of primary colours. RGB (which is the model best suited for computer screens) mixes red, green and blue. CMYK (the model most often used for printing) uses cyan, magenta, yellow and black. Other colour models include CIE Lab, HSB and spot colours, such as Pantone or Tru-match. In the example here, we show how a single colour is represented using several different colour models.

Colour Management

To ensure that what you see on-screen is what you get in print, colour management is critical. Colour management produces colour all the way from scanners and digital cameras to the screen to printers, colour proofers and image setters. The International Color Consortium (ICC) has established a standard for creating profiles. In this example, we created an ICC profile for our monitor in Photoshop.



Our story takes in all the usual suspects—including products from Adobe and Corel—with one exception: Macromedia's xRes (Macromedia has not updated xRes in a year). Adobe was still working on the next version of Illustrator during our testing cycle; the final version should be available by the time you read this. We tested an early beta of Illustrator 8.0 for this roundup.

Traditionally, image-editing and illus-

tration programs have occupied separate worlds. Image editors were designed for bitmap images such as photographs, while illustration packages were object-oriented tools used for vector graphics. But these distinctions aren't so clear-cut anymore. For instance, image-editing programs now feature better text-handling and layout tools. Similarly, illustration programs are becoming more detail-oriented, allowing the use of colours and effects to produce

more realistic-looking (that is, bitmap-like) images. Two products, Deneba's Canvas 5.0.3 and Wright Design 2.0, straddle both categories and throw in some page layout tools to boot.

Layers and objects—once the domain of illustration packages only—have now become the standard in image-editing programs as well. The advantage of using layers is that you can add new elements such as brushstrokes to projects without



● Image Editing: Adobe Photoshop 5.0

● Illustration: CorelDraw 8



The term "professional graphics" covers a lot of ground. Designers use

graphics software to prepare existing images for print or the Web, illustrators use these packages to create original works of art, and engineers and architectural designers rely on illustration programs to draft 2D models. With all these applications, choosing the best products was no easy task.

In the image-editing category, Adobe Photoshop 5.0 is our program of choice this year. Photoshop excels in the two areas that we feel are most important to the majority of design professionals: image editing (or photo editing) and compositing—the process of combining elements from two or more images to create a new image. This new version of Photoshop also includes some major new features users have been clamouring for including multiple undo and redo using the History palette, better text handling, Layer Effects and integrated ICC (International Color Consortium) support.

Photoshop is still not perfect. Its painting tools are adequate, but they can't match those of Corel Photo-Paint 8 and MetaCreations' Painter 5. And Photoshop's Web graphics features are minimal compared with those

of Photo-Paint and Micrografx's Picture Publisher 8. (Adobe's answer for Web graphics is a separate product called ImageReady.) Picture Publisher earns an honourable mention in this category for its Web graphics tools, and Painter gets an honourable mention for its unique natural-media painting capabilities.

In our illustration category, CorelDraw 8 was the only product capable of doing everything, making the software our current choice for creating vector graphics. CorelDraw earned above-average scores on all four of our illustration tasks: artistic illustration, technical illustration, print output and Web output.

This version of CorelDraw includes several usability enhancements, most notably the ability to apply and edit drop shadows and distortion effects directly using drag-and-drop operations. A new Palette Editor lets you create and edit custom colour palettes. CorelDraw also includes a decent set of technical illustration tools. Finally, the program's print output has improved significantly, and its Web tools are thorough and well integrated.

Although we did not consider Adobe Illustrator 8.0 for Editors' Choice because it was still in beta during our testing, this new version looks very promising. Macromedia's FreeHand 8 offers the best Web tools, including Flash animation, and Deneba's Canvas 5.0.3 earns high marks for technical illustration.

affecting the underlying images. Because graphical elements on layers can be edited or removed, you can experiment freely without fear of ruining an image or losing your work. Not all image-editing packages take the same approach to layers. Micrografx's Picture Publisher 8 uses layers or objects for compositing but not for painting. At the opposite extreme, Wright Design defines everything, even brushstrokes, as objects that are filled with layers.

Basic image-editing functions, such as controls for adjusting colour, exposure and focus—or for applying special effects—reached a level of maturity years ago. Advances in this area are now related more to how effects are applied and whether they can be changed easily later. Currently Adobe Photoshop 5.0, Corel Photo-Paint 8, MetaCreations' Painter 5 and Wright Design are taking advantage of

layer technology to add re-editable objects that apply effects to underlying layers, such as drop shadows on text. We expect these productivity-enhancing tools to become even more prevalent in coming years.

This year, it seems that graphics vendors have placed as much emphasis on being able to undo things as they have on actually doing them. Photoshop's History palette, Photo-Paint's Undo list and Picture Publisher's Command Center all save recent changes to an image so that you can skip back to a previous version. But not all undos are created equal. Photoshop's History palette cannot be saved with the image or as a separate file (although periodic snapshots can be archived). Picture Publisher's list lets you return to a previous change, such as a filter or a hue shift, and adjust its parameters—something neither Photoshop nor Photo-Paint supports. Photo-Paint also

does not permit branching (or non-linear editing) using the Undo list. And only Photoshop has a History Brush, which allows users to paint selectively from a previous version of an image onto the current version.

Illustration programs are also getting tools that encourage greater experimentation and creativity. Drawing tools such as Macromedia FreeHand 8's Freeform push-and-pull tool and Adobe Illustrator's new Pencil are more intuitive than the traditional Bezier tool. CorelDraw 8's Lens Effects and FreeHand's transparency options greatly enhance an object, and other bitmap-like effects, such as CorelDraw's texture fill, lend near-photo-realism to illustration.

Last year, we found that colour management was still problematic on the PC. This year, we're happy to report that colour management is greatly improved,

editors' choice



thanks to better support for ICC (International Color Consortium) profiles. ICC is a standard for writing hardware device profiles to ensure that the colour you see on-screen matches what you get in print. Apple's ColorSync and Microsoft ICM 2.0 (Image Color Management) are based on the ICC standards. Software and hardware vendors are already taking advantage of ICC, fine-tuning the profiles for optimal output. The results are astonishing. For example, Picture Publisher's colour is now right on. Photoshop's print quality is still the finest, but on our tests, its colour fidelity was average.

Because these programs were initially designed for print and prepress, the Web graphics features vary greatly. Most programs allow you to reduce 24-bit photo-realistic images to 8-bit images that are appropriate for the Web. But Photo-Paint and Picture Publisher currently offer the best integrated Web tools. You can convert objects into hot spots by simply entering the target URLs in their Properties dialog boxes. Both allow you to generate client- and server-side image maps. When downsampling images to indexed (8-bit) colour, Picture Publisher provides previews plus download estimates, and the images it produced looked best in our browser.

Other programs such as Photoshop and Wright Design rely on separate utilities for Web graphics features. Adobe has created a separate program, ImageReady, which can be used with Photoshop or as a standalone program. In fact, Web graphics have become so important that a separate image-optimisation and automation category has emerged. In addition to ImageReady, this new category includes standalone programs such as Macromedia's FireWorks and Equilibrium's DeBabelizer Pro.

Perhaps graphics software as a category is growing a little too fast. Most of the products we looked at are having trouble keeping up in all these growth areas, and no one program excels at everything. Photoshop and Wright Design offer the best photo-editing and composition tools. But Wright Design offers little in the way of painting tools, and neither program places much emphasis on Web features. Picture Publisher is great at Web graphics but

mediocre in other areas. Illustrator and FreeHand excel at artistic illustration—and FreeHand has some great Web features—but both are lacking in technical illustration tools. Corel's products probably come closest to addressing all areas,

but Photo-Paint still has some problems to resolve in the critical area of compositing.

Therefore it is important to pick the graphics packages tailored to the jobs you perform most often. Our hands-on product reviews will give you a good head start.

image editing

Adobe Systems

Adobe Photoshop 5.0

\$1495 (upgrade, \$429, upgrade from LE version, \$499). Adobe Systems, 1800 065 628; www.pacific.adobe.com



With the release of Photoshop, Adobe helped invent the desktop imaging market, but in recent years it seemed as if Adobe had left innovation to its competitors. That is, until the release of Photoshop 5.0, one of the more significant upgrades to come from Adobe in years. Among the many improvements in this version are multiple levels of undo and redo, enhanced text handling, better colour management, and new productivity tools. Photoshop 5.0's painting tools are only average and Web features are minimal, but when you combine its new features with the best output in the business, it remains the benchmark.

Perhaps the single most important advance in Photoshop 5.0 is the History palette, which maintains a list of all recent actions so that you can backtrack to any previous stage in the editing process. Along the way, you can take snapshots of your project.

When using the History palette, you can either delete specific steps or undo steps; the latter functions like a one-click multiple undo, deactivating all subsequent steps. You can't return to a step and change its parameters. However, you can configure the History palette for non-linear editing so that you can return to a prior version of your project and undo that step without sacrificing subsequent edits. You can't save the history with the image, but you can save snapshots.

The History Brush can be used to paint the contents of a prior version of the image onto the current version. For example, you can apply a Gaussian Blur to your

entire picture, remove it, and then use the History Brush to paint the Blur onto selected areas only.

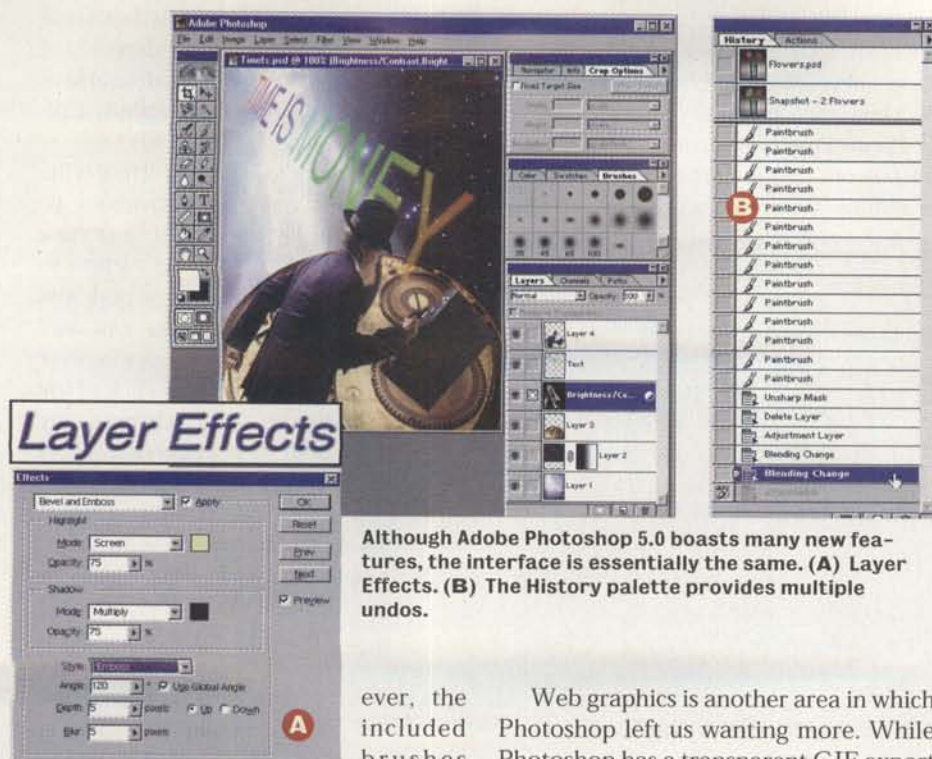
Photoshop 5.0 also addresses some long-standing complaints about the program's text tools, adding tracking, kerning, leading and baseline shift. Each character can be a different size and font, but colour applies to the entire text block. The new vertical type tool is so useful that it is hard to imagine how users ever functioned without it.

The new Layer Effects feature makes it easy to add shadows, glows, bevels and embossing to text or to any other item that resides on its own layer. Each time you make a change to that layer, the effects are automatically updated. For example, if you move text, its shadow will move with it. And the effects remain editable.

In addition to a proprietary colour-management system, Adobe has added support for device profiles based on the ICC standard. This version of Photoshop supports sRGB, a proposed standard that would eliminate the need to profile each monitor separately. Users would still need ICC profiles or other colour management systems across the entire workflow.

The core tasks of image editing are photo editing and compositing. In these areas, Photoshop remains virtually unparalleled. On our collage test, it performed flawlessly. Each layer can have its own mask, which can be created using Quick Mask, the Channels palette, or other methods. New Magnetic Lasso and Pen tools, for instance, make it easier to make selections or create clipping paths.

Photoshop's painting tools are serviceable but not state-of-the-art. You can design new brushes and use stylus pressure to alter colour, opacity and size. Also, with the ability to create empty layers, no stroke need be permanent. How-



Although Adobe Photoshop 5.0 boasts many new features, the interface is essentially the same. (A) Layer Effects. (B) The History palette provides multiple undos.

ever, the included brushes pale in comparison with those in Corel Photo-Paint 8 and MetaCreations' Painter 5.

Web graphics is another area in which Photoshop left us wanting more. While Photoshop has a transparent GIF export wizard and the ability to create custom palettes for indexed images, you can't create hot spots or image maps, and Photo-

shop doesn't generate average palettes. Rather than integrating Web features into Photoshop, Adobe has introduced a separate product, ImageReady, which adds these features.

Photoshop's print output continues to be the best, with smoother, cleaner lines and less pixelisation (excluding text) than in other programs. The dynamic range is also good, though leaning toward dark, but the program's colour matching was subpar on our tests.

Corel Photo-Paint and Painter offer better painting tools, and Picture Publisher integrates more Web graphics features, but Photoshop is still the one to beat when it comes to the key areas: image editing, compositing and crisp output. New features in Photoshop 5.0 should satisfy its many users and keep the program on top for some time to come. —Sally Wiener Grotta and Daniel Grotta

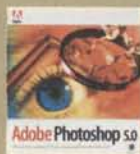
Corel

Corel Photo-Paint 8

\$636 (upgrade, \$209). Corel, 1800 658 850; www.corel.com

Corel Photo-Paint is back in a new version

suitability to task: image editing



POWER

	Adobe Photoshop	Corel Photo-Paint 8	Painter 5	Picture Publisher 8	Wright Design 2.0
Photo Editing	Excellent	Excellent	Fair	Good	Excellent
Compositing	Excellent	Good	Fair	Good	Excellent
Painting	Good	Excellent	Excellent	Fair	Fair
Web Graphics	Fair	Good	Poor	Excellent	N/A

EASE

	Adobe Photoshop	Corel Photo-Paint 8	Painter 5	Picture Publisher 8	Wright Design 2.0
Photo Editing	Excellent	Excellent	Good	Excellent	Excellent
Compositing	Excellent	Good	Fair	Good	Excellent
Painting	Good	Excellent	Good	Fair	Excellent
Web Graphics	Good	Excellent	Fair	Excellent	N/A

N/A—Not applicable. The product does not have this feature.

Photo editing is the process of perfecting an image and includes such features as tonal controls (exposure and dynamic range), color balance and hue shift, focus, filters and cloning. For adjusting exposure, there should be a gamma curve, a histogram, and a contrast/brightness tool, and edits should be applicable to individual colour channels. In addition, dialogs should offer real-time previews, and users should be able to redo any changes applied to a picture.

The ability to create and redo precise masks easily is vital to **compositing**, the process of selecting elements from two or

more images and combining them to create a new image. A robust layers or objects palette is crucial. Other key features include easy and effective masking and selection tools.

In the **painting** category, we look for tools that are easy to use and that unleash users' creativity. The tools should include a rich and varied default set of brushes, and the program should let users create and save new brushes. Colour palettes should be easily accessible, so that users can change colours without interrupting the painting process. The ability to paint on an empty layer or object is critical, because it lets users paint without merging the strokes

into underlying pixels.

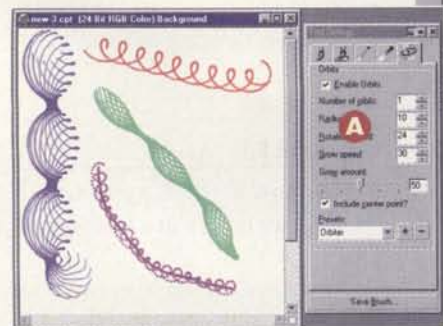
To create **Web graphics**, the program must convert 24-bit (or 32-bit) images into 8-bit colour pictures appropriate for the Web. During downsampling, the program should provide a flexible palette, a preview window, and an estimate of the time required to download. Some programs include batch-processing tools for creating graphics with indexed colours. Users should be able to define URL hot spots from within the program and generate server- and client-side image maps. Our rating also reflects the quality of the graphics produced when viewed within a browser.

SOFTWARE

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that is no bigger (it actually shrank) but is certainly better. In addition to a streamlined interface, Corel has grouped related tools together and added dynamic brushes and integrated colour management. Photo-Paint's compositing tools are not as good as those of Adobe Photoshop or Wright Design 2.0, but the program provides the broadest range of tools, making it an excellent value—especially if you purchase it as part of the \$899 CorelDraw 8 suite.

Although it retains the same toolbox, pull-down menus, tool property bar, and status bar Photo-Paint's interface has been enhanced. Some of the roll-up palettes are now *Dockers*—tabbed palettes attached by default to the right side of the workspace.



quickly. But on our tests, it failed to produce an accurate mask. Adobe Photoshop's new Magnetic Lasso tool seems to do a better job at identifying edges.

Photo-Paint's Undo list is a basic compilation of all the edits that can be removed or redone. While you work, you can take

immediately accessible in swatches along the screen's right edge and in a Roll-Up of the full spectrum. You can create and save custom colour palettes in the Palette Editor.

Photo-Paint's Gradient fill tool is the easiest and most versatile we have seen. To

apply a gradient, just click and drag in your picture to position the initial mid- and end-points. You can add points and colours wherever you want with a click of the mouse and change any node's transparency level using a slider control.

Once a separate utility, colour management is now integrated and is ICC-compliant. The results, though not perfect, are far better than those we saw in Version 7.0. Printouts look very similar to screen

images, and moving a picture among colour models (such as CMYK, RGB and others) does not degrade tone or hue on screen.

Photo-Paint's Web graphics tools are

well-rounded. To create a hot spot, you select an object and enter the target URL in the Object Properties dialog box. The hot spot area can be a rectangle, a circle, a bounding oval, or the shape of the object. Indexed (8-bit) colour

options are extensive, and there's even a batch conversion utility that creates an average palette for a group of images.

Photo-Paint's compositing tools are improving. Its brushes, textures and colour options are a delight to use, and the Web graphics tools are extensive, making it the one-stop shop for all types of image-editing tasks.—SWG and DG

MetaCreations

Painter 5

\$629 (upgrade from any version, \$229). Scholastic, 02 4328 3555; www.metacreations.com

Created by Fractal Design and now owned by MetaCreations, Painter is the

Photo-Paint's workspace includes tabbed palettes called Dockers and colour swatches on the right edge of the screen. (A) The Orbits dialog multitipped brush-strokes. (B) Index colour options.

periodic snapshots of your image, called Check-points, in case you need to restore a prior version. And, unlike in Photoshop's History palette, the Undo list may be saved in its own file.

Although Photo-Paint is accomplished in nearly all areas, its painting features are its strongest suit. Photo-Paint's rich collection of dynamic, detailed, and highly customisable brushes and textures make painting on the PC the fun process it should be. To further expand your toolset, you can use any image as a brush texture.

The new Orbits painting mode consists of multiple nibs that, during painting, dynamically interact with one another according to a pattern you assign, creating lively strokes. Orbits also work with Photo-Paint's Image Sprayer, so you can create sets of your image that dance about as you spray them onto your canvas. Brush Symmetry creates a mirror image of your strokes while you paint. Color controls are



One of the strongest features of the previous version was the meshing of both layerlike and objectlike behaviors. In Version 8, Corel has made the merger even smoother by combining layer and object tools into the Objects docker. This means that collaging in Photo-Paint requires fewer mouse clicks than before.

Photo-Paint's Lens Effects are objects that contain commands rather than pixels. For example, a Lens Effect can contain a gamma curve or a colour correction, affecting either all the objects below it or only the object directly below the Lens. Lens Effects remain fully re-editable.

Masking is lean and powerful. The object transparency tool applies a gradient mask directly onto the object, so you can view the effect immediately, without having to activate an alpha channel. Unfortunately, gradient masks are not re-editable (unless you create them as clipping masks). You can also paint levels of transparency directly on to an image.

The new Magic Scissors Mask tool is designed to locate the edges of objects

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SUMMARY OF FEATURES

Image Editing



■ YES ■ NO

	Adobe Photoshop 5.0	Corel Photo-Paint 8	Painter 5	Picture Publisher 8	Wright Design 2.0
Price	\$1495	\$636	\$629	\$205	\$895
Direct pixel editor/On-demand pixel editing with rendering	■ ■	■ ■	■ ■	■ ■	■ ■
One-click multiple undo	■	■	■	■	■
Painting and Drawing Tools					
Airbrush/Charcoal/Crayon	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Felt-tip pens/Oil/Watercolour	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Pen and ink/Pencils/Calligraphic line	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Clone/Revert clone/Artistic clone	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
User can create/edit/save brush	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Pressure sensitivity	■	■	■	■	■
User can specify transparency	■	■	■	■	■
Brushes can react to paper texture	■	■	■	■	■
Brush strokes on empty layer or object	■	■	■	■	■
Brush strokes are readable	■	■	■	■	■
Arcs/Circles/Polygons	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Freehand/Bezier (spline)	■ ■	■ ■	■ ■	■ ■	■ ■
Image spray/Paint with picture	■ ■	■ ■	■ ■	■ ■	■ ■
Linear and Radial Gradient Fills					
User-definable shape/angle/centre	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Spectrum gradients/multiple colour gradients/node transparencies	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Selection and Collaging					
User can save masks as alpha channels/independent files	■ ■	■ ■	■ ■	■ ■	■ ■
Image can be defined as alpha channel	■	■	■	■	■
Masks are readable/rotatable	■ ■	■ ■	■ ■	■ ■	■ ■
Layers/Layer palette/Layer masks	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Objects/Object palette/Object masks	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Magnetic selection tools	■	■	■	■	■
Path to mask/Clipping paths	■ ■	■ ■	■ ■	■ ■	■ ■
Image Processing					
Equalizing/Anti-aliasing	■ ■	■ ■	■ ■	■ ■	■ ■
User can edit histogram/gamma curve/by channel	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Number of included filters and effects	114	More than 70	36	127	More than 100
User-definable automation plug-ins or production macros	■	■	■	■	■
Lens Objects, Adjustment Layers, or equivalent	■	■	■	■	■
Multiple undo and redo list	■	■	■	■	N/A
Can be saved with image/saved as file	■ ■	■ ■	■ ■	■ ■	N/A
Snapshot/Branching (nonlinear multiple undo)	■ ■	■ ■	■ ■	■ ■	N/A
Memory purge	■	■	■	■	■
Web Graphics					
Objects or selections can be defined as URL hot spots	■	■	■	■	■
Client-side/Server-side image maps	■ ■	■ ■	■ ■	■ ■	■ ■
Palette indexing/Editable colour tables	■ ■	■ ■	■ ■	■ ■	■ ■
Exports animated GIF/transparent GIF	■ ■	■ ■	■ ■	■ ■	■ ■
Text Handling					
Vector-based text	■	■	■	■	■
Text is readable	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Kerning/Leading/Tracking	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Linked columns/Paragraph formatting/User can define styles	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Fit text to path/Rotate/Distort	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Prepress					
User can specify CMYK channels independently	■	■	■	■	■
Spot colour	■ ■	■ ■	■ ■	■ ■	■ ■
User can define/save ink	■ ■	■ ■	■ ■	■ ■	■ ■
Supports ICC colour management	■	■	■	■	■

N/A: Not applicable—In Wright Design, you can save all actions on separate layers and change them at any time.

SOFTWARE

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product that broke the mould for professional image editing. Its interface flies in the face of tradition, and its approach to image-editing tasks is often unorthodox. Nevertheless, Painter has prospered on the strength of its unique Natural Media brushes and textures. Painter is not designed to replace mainstream image-editing packages such as Adobe Photoshop; rather, it makes a great complement to them.

With its proliferation of palettes and tools scattered in different locations, Painter is not an easy program to master. But the documentation is superb, and the tutorials (contained in a 97-page booklet) are among the best in the business.

Painter includes more than 100 new brushes that, when combined

add special effects to images.

The plug-in floaters are dynamic special effects that act on selected objects—similar to Lens Objects in Corel Photo-Paint. The creative control they offer over applying texture and dimensionality is remarkable, but they have some



Painter's workspace contains a disconcertingly large array of palettes and toolbars, but the documentation is superb. (A) Liquid Metal Plug-in. (B) Painter offers unique filters.



with the dizzying array of textures and surface controls, add up to a tool library that you could spend days experimenting with and never repeat the same task. The downside is that it can be tough to find exactly the tool you need.

Painter's masks now behave according to the industry standards. However, layers (MetaCreations calls them *floaters*) and masks are organised in two nested palettes; hence you must move between them to work on your image. Perfecting masks and selections remains difficult. For example, the gradient mask can't produce crisp whites or blacks.

The other major drawback to Painter is that it is lacking in some key image-editing areas. For example, compositing is not smooth; tonal and exposure controls are minimal; and the orientation tools (scale, rotate and so forth) are not accessible from the bounding box of an object.

Painter makes up for these flaws with its unique, natural media-painting capabilities. Perhaps the biggest advance in this version is the new, open plug-in architecture for brushes and floaters, which

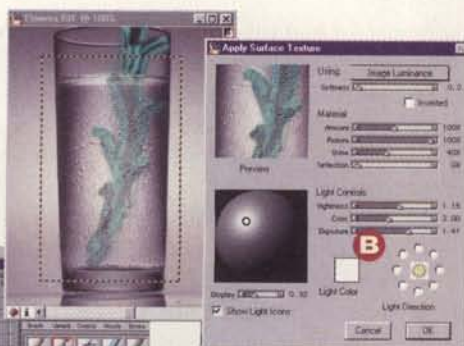
weaknesses: only one plug-in per object remains editable because, when you apply a new one, the earlier one is merged into the pixels that make up the object or floater beneath. In addition, you can't cancel most plug-in floaters from within the dialog box (you have to apply it and then undo it).

The new plug-in brushes include glowing, fiery brushes, useful photographic tools, more variable cloners (brushes that distort the underlying pixels), and others. An important development is the plug-in brushes that let you paint on a new layer.

Unlike most image-editing packages, Painter includes filters that alter lighting and textures rather than creating special effects. But they are not sleek; many lack previews; and those that do have previews don't allow you to zoom in or out. Also, once you apply a filter, you can't edit it.

Painter's animation tools, the most advanced in this roundup, include onion-skinning (for viewing a sequence of overlaid frames simultaneously) and roto-scoping (for painting on movies).

Painter is compatible with Photoshop 3.0 filters but not those of later versions.



Painter also now supports Photoshop's PSD file format, keeping layers, channels and paths intact. But it is strictly an RGB editor: Painter does not support CMYK files or colour model conversions. Painter 5 is ICC-compatible; it has a simple dialog for selecting profiles. But it lacks a gamma dialog for profiling monitors and ink setups for

prepress.

In our print tests, Painter produced bright, crisp colours with a decent dynamic range. Type was nicely formed, with no obvious jaggies. However, Painter does not produce true blacks (its black is more of a midnight blue), and the colour fidelity was not as good as that of the other programs we tested.

Painter's Web tools are uneven. The included Bevel World plug-in makes nice buttons for Web pages, and seamless tiled backgrounds are easy to do. You can assign URLs to objects in the Object properties dialog box, and the hot spot can be a rectangle or oval (or polygon, for vector shapes only). Other Web features such as indexed colours and image maps are less developed.

For photo editing, collaging and Web graphics, get another program. But for applying colour, texture and light to your digital images in creative ways, Painter 5 is unsurpassed. —SWG and DG

Micrografx

Picture Publisher 8

\$205 (upgrade, \$95). Micrografx, 1800 644 298; www.micrografx.com

Micrografx's Picture Publisher is the most affordable and one of the easiest programs to use in this category. Version 8 adds

more macros and wizards to further simplify image editing. And Picture Publisher 8's Web graphics tools are without question the most sophisticated in its class. But the program's lack of some key features, such as easy multiple undo and separate layers or objects for painting, limits Picture Publisher's appeal.

Picture Publisher's documentation is scant, and the online help fails to fill the gap, but the program provides many other features that make it easy to use. Knowledge wizards help you get up to speed on specific tasks. Picture Publisher's interface is crammed with information that helps guide the user and provides control over tools. Besides the traditional toolbox, Picture Publisher has a variety of tool options and a status bar.

Picture Publisher provides extensive control over composite images. Using objects rather than layers, all pasted selections and new text function independently of each other. The Objects Manager offers single button access to object masks, which remain distinct and re-editable. In addition, masks can be saved as separate files and used in other images. Creating drop shadows is another mouse-click control, but this works only if the object does not flow over the picture margins. Unfortunately, the Objects palette offers nothing like Adobe Photoshop's Adjustment Layers for applying effects on a separate layer. Nor does it give controls for the objects it contains; you must open the View menu to access object properties.

Because Picture Publisher has no provision for creating empty objects on which to paint, brushstrokes must be placed over existing pixels. Furthermore, there is still only one level of undo. Micrografix claims that its Command Center takes the place of multiple undos, but this feature can be cumbersome to use. For example, to undo two brushstrokes, Command Center must rebuild the entire image from the first edit onward. Like Adobe Photoshop's History palette, Command Center supports nonlinear editing. But Command Center also lets you save the edit list with the image file.

Picture Publisher offers an impressive

variety of brushes and textures. You can save custom settings to be used with the image spray tool. Gradients now offer multiple colours and transparency levels at each colour point. There are also more than 140 filters, macros and special effects. Unfortunately, many of the macro effects apply not to selections but to entire images only.

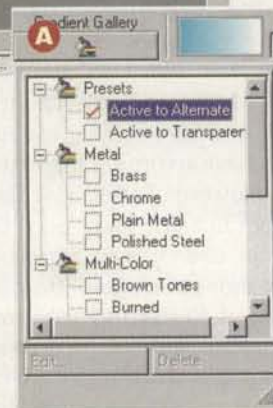
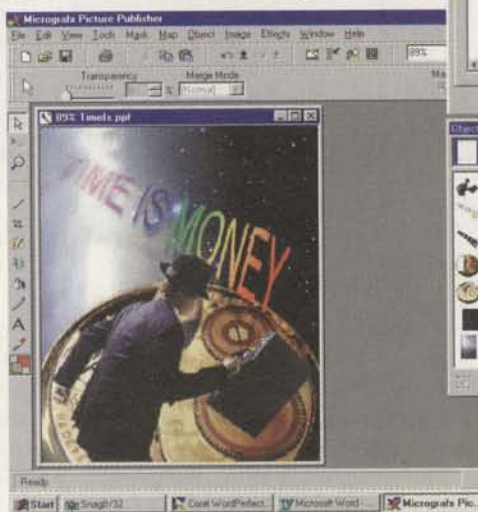
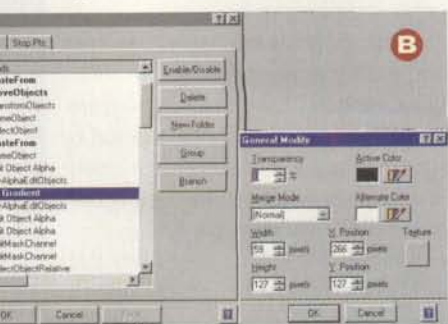
Picture Publisher offers two methods for working with large files. FastBits divides high-resolution images into a grid; you can open segments of the grid and perform edits, which are then saved back to the full image. Or you can work on an image's low-res-

olution version, save the version in Micrografix's PPF file format, and then link it to the original file.

Web tools are Picture Publisher's strongest suit. The Web Output wizard is an easy step-by-step guide for saving GIF or JPEG files and previewing the results in your Web browser. The JPEG save dialog, which allows before and after previews and download estimates, is one of the best we've seen. The Web Output wizard and the Save As dialog, however, lack the extensive control over transparency found in the manual Export/GIF dialog box. As in Corel Photo-Paint 8, you can assign a URL to an object in its Properties dialog box. In addition to custom-colour palette options, the program has a wizard for creating average

Picture Publisher's Object Manager lists all the elements that go into a composite image. (A) Gradient Gallery (B) Command Center.

palettes and performing batch conversions. Picture Publisher has increased the number of wizards that automate tasks. The Web Styles wizard has templates for Web pages, including graphical buttons. A contact-sheet HTML generator creates pages of thumbnails that link to the full-resolution images.



an astonishing level of colour fidelity among colour models (RGB, CMYK and Lab) and between the screen and the printed image on our tests. Unfortunately, the text exhibited jaggies, and the general printed image quality was not as impressive. You can open multiple images—each in its own colour space on your screen, however. Note that the Color Management module can be accessed only through the Custom install option.

When preparing images for the Web, Picture Publisher's ease and power are

tough to beat. But design professionals who need to create artwork for multiple media types should look to a more comprehensive program such as Photoshop or Photo-Paint.—SWG and DG

Wright Technologies

Wright Design 2.0

\$995 (upgrade, \$200). Wright Technologies, 02 9690 2100; www.wright.com.au

Wright Design 2.0 tries to do it all—image

Professional Graphics

editing, illustration, text handling and page layout—within one object-based interface. In Wright Design, Wright Technologies has achieved a level of integration and intelligence that makes editing and compositing much easier and faster than in other programs—once you get a handle on the program's non-standard interface. Unfortunately, some important features, such as ICC profiles support and Web graphics tools, are lacking.

The biggest drawback is that Wright Design takes time to learn because it doesn't work like other desktop graphics programs. The PDF-based tutorials introduce the basics, but they are inconvenient. The documentation is thorough,

image in one layer, tweak a hue shift slightly, rotate a mask or add a new filter whenever you wish. The Object List maintains the relationships between these layers.

The tabbed Paint Styles palette con-



In Wright Design, each element of the image is defined as a separate layer in the Paint Styles palette. (A) Brushstrokes are objects that can be filled with anything. (B) Multitasking in Wright Design.

tains all the fill and stroke types that may be applied to an object. For instance, in our test composition, one elliptical object contained two bitmaps, a gamma curve for each, and a gradient mask—each defined as a separate layer. What's more, when we edited a Bezier curve that defined the object shape, we could refine a silhouette mask that cut the two bitmaps from their original images. In fact, since no bitmap image is actually changed during editing, you can always restore any portion or paint back sections using the negative masking brush.

You can save any custom Paint Style, such as a colour that is applied at a specified transparency or with a certain blend mode. In addition, any object (or individual fill) can be saved as a separate picture, enabling it to be used as an alpha channel. The transformation tools are very accessible and may be used interactively on objects or by inputting values.

Although image editing and compositing are first-rate, painting with Wright Design is disappointing. The brushes are limited. But in keeping with Wright Design's easy editing philosophy, the

colour, fill, transparency and shape of a brush stroke can be changed at any time.

Wright Design's artistic illustration and text tools are quite good. The shadow command creates a duplicate object with a translucent fill that can be edited independently

of the original object. But when you move or alter the original, the linked shadow is changed appropriately.

Text handling is versatile, with paragraphs, columns, drop caps, text linking among objects, kerning, tracking and various path shaping. Any open or closed vector shape can be made into a text container. Text envelopes can be edited using the Bezier tool. Rather than importing text directly, however, Wright Design uses the Windows Clipboard.

Since the program was built on Windows NT 4.0, which does not support ICC profiles, Wright Design relies on a gamma dialog box for calibrating your monitor and a sample printed page (which is not included) to correct CMYK output. Once you become adept at fine-tuning the colour management, the printouts are smooth and crisp, with decent colour matching the screen. Vectors and bitmaps can peacefully coexist in the same output file.

Wright Design 2.0 is a remarkable production tool that successfully combines top-notch compositing, superb text handling, and excellent illustration features. Despite its nontraditional interface and missing features, Wright Design is an innovative program that will influence the graphics industry.—SWC and DG

however. And once you've invested the time to learn the program, you'll be rewarded with Wright Design's powerful features.

An on-demand pixel editor, Wright Design offers real-time editing even in high-resolution images. Although photos and other bitmap images must be converted to Wright's proprietary DCM file format, batch conversions are quick. The layout, vector objects, text and other edits (including pointers to the original bitmap files) are saved in Wright's WDD format. Rendering may be time-consuming, depending on the image's complexity and the destination file format, but you can off-load it to a network server or another client. And since Wright Design was built on Windows NT, it provides true multitasking and multithreading.

In a layout, objects can contain layers of fills. These fills can include bitmap images, gamma curves, colour, masks and so on. Everything always remains re-editable. For example, you can replace an

illustration



Adobe Systems

Adobe Illustrator 8.0 (beta)

\$895 (upgrade, \$249). Adobe Systems, 1800 065 628; www.pacific.adobe.com

In a reference to its tight integration with Adobe's page-description language, Adobe Illustrator has been described as "a front end to PostScript". True to this form, Version 8.0 of Illustrator introduces several spectacular new drawing tools driven by Adobe PostScript 3. We tested a beta version of Illustrator 8.0; the final version should be available by the time you read this. Based on our preview, we feel that Illustrator 8.0 will be a significant upgrade, with new tools for Illustrator veterans and

usability enhancements that make the program more accessible to new users.

Chief among Illustrator 8.0's new fea-

tures is the Gradient Mesh tool, which places an editable, wire-frame grid inside an object outline. Because you can assign a different colour to each vertex, you can create a multidirectional blend of different colours that can model an object's surface or simulate watercolour washes.

Other PostScript 3-related features include Illustrator's new multiple-shape blends and Art Brushes. An Illustrator blend can now include more

than two objects, and both the shapes that form the blend and the path along which the blend is arranged can be reshaped using standard Bezier editing tools. Art Brushes—similar to tools introduced in MetaCreations' Expression—allow you to "paint" with vector graphics. Options in the Brush-



Illustrator's new Gradient Mesh allows you to apply colours to each vertex in a wire-frame. (A) The Scatter art brush lets you paint with a vector image. (B) Attributes palette.

Suitability to Task: Illustration

				
POWER	Adobe Illustrator 8.0	Canvas 5.0.3	CorelDraw 8	FreeHand 8
Artistic illustration	Excellent	Fair	Excellent	Excellent
Technical illustration	Fair	Excellent	Good	N/A
Print output	Excellent	Good	Good	Excellent
Web output	Good	Good	Excellent	Good
EASE				
Artistic illustration	Excellent	Fair	Good	Excellent
Technical illustration	Good	Good	Excellent	N/A
Print output	Good	Good	Excellent	Excellent
Web output	Excellent	Good	Excellent	Excellent

N/A—Not applicable. The product does not have this feature.

In the first category, **artistic illustration**, we look for flexible and robust handling of page layout, including support for multiple pages and folded paper and the handling of margins and gutters. We also take into account the program's ability to create objects easily and to apply special effects such as intersections, gradients, patterns, textures and perspective. During editing, colour pickup and an ability to model the selection and save colour palettes are also important, as is the ability to utilise the objects in layers.

To receive good marks in the **technical illustration** category, an illustration package should let the user draw lines to exact dimensions, snap to grid lines and enter specific values in a dialog box. Also, the precision tools should allow for angle and line bisection, should measure or constrain the angle of a line, and should be able to snap to a specific point on another object (such as a tangent point on an ellipse or circle). A big plus is automatic dimensioning, which lets the user draw to scale or change the size of an object by altering the value of the dimension line. A robust application will integrate well with CAD packages by providing support for both layers and AutoCAD's DXF (Document Exchange Format) files.

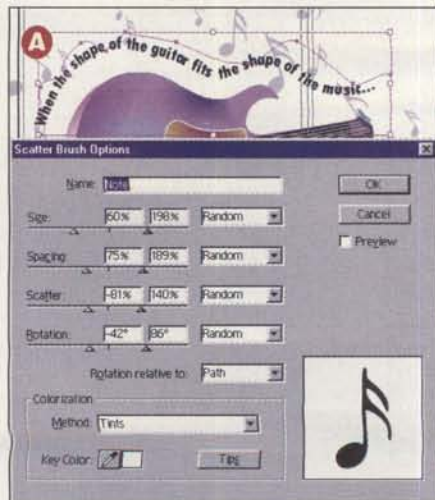
To deliver optimal **print output**, the program should print grey-scale drawings with crisp lines and solid blacks and whites. It should also render hatch patterns with smooth, fine lines. The program should support a range of export file formats, including EPS, GIF, JPEG and WMF files. On colour-printing tasks, we look for reliable support for maintaining CMYK values, easy and effective calibration routines, printer-profile settings and print-preview tools to assist the user in obtaining accurate colour prints. We also examine how well the colour output matches the screen image and whether it suffers from moiré patterns or banding. Last, we like programs that have easy-to-use colour-separation controls with reporting mechanisms.

In our final category, **Web output**, we look for the ability to export to GIF, JPEG and HTML. We also test each program's animation features, JPEG compression, dithering controls and transparency support. Illustration programs should let users easily create common Web page elements such as buttons and URL hot spots. Some programs also provide output alternatives based on Java or Adobe's PDF for faithful rendering of complex illustrations and layouts that can be viewed in a browser.

es palette let you determine whether a brush stroke will create a single object, scatter multiple copies of the object along a path or produce a regular pattern.

These admittedly complex tools are balanced by new functions that actually make Illustrator more accessible to nonprofessional artists. A standard selection mode (with handles that let you resize objects directly) eliminates that initial period of frustration for new users unfamiliar with Illustrator's Direct Select and Group Select tools. Likewise, the Free Transform tool provides a single gizmo box to size, skew, rotate and distort outlines. More important, Illustrator 8.0 supplements traditional Bezier curve tools with easy-to-use drawing tools. For example, after you've drawn a freehand line with the Pencil, you can use the same tool to reshape the curve by drawing segments of the line over again. And the new Smooth tool lets you remove unnecessary nodes and polish curves with a simple dragging motion.

We were impressed with Illustrator's elegant solutions for common drawing tasks. Though you still can't save defined styles, you can use the improved Eyedropper to copy attributes from one object to another. You can also automatically update related tints in a document. And, no matter



whether you've filled a shape with text, changed the orientation from horizontal to vertical, or flowed text along a path, you have access to Illustrator's robust typography controls. Best of all, the new Actions palette lets you create macros for frequently used commands and/or drawing sequences; an included Action generates buttons for Web pages.

Despite these many enhancements, there are still a number of areas where Illustrator is either idiosyncratic or falls short. For example, Illustrator easily generates GIF, JPEG and URL image maps for the Web, but it does not offer HTML, vector, or Web animation formats. The rudimentary autotracing is suitable only for simple outlines, and the program has no 3D extrusion tools (although you can create 3D effects with Actions and Blends). For these functions, you'll need third-party plug-ins or other Adobe products.

Similarly, as we discovered on the technical illustration portion of our script, Adobe relies on plug-ins to extend Illustrator's technical illustration capabilities. Although the program has some technical tools, including custom grids and guides, global constraints and a new Smart Guide

SUMMARY OF FEATURES

Illustration



■ YES ■ NO	Adobe Illustrator 8.0	Canvas 5.0.3	CorelDraw 8	FreeHand 8
Price	\$895	\$799	\$799	\$679
Macro recorder/OLE server/OLE client	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Illustration Management				
User can lock/hide objects	■ ■	■ ■	■ ■	■ ■
User can lock/hide layers	■ ■	■ ■	■ ■	■ ■
Includes master pages/templates	■ ■	■ ■	■ ■	■ ■
User can move objects between layers	■ ■	■ ■	■ ■	■ ■
Object manager	■ ■	■ ■	■ ■	■ ■
Object properties/Object data	■ ■	■ ■	■ ■	■ ■
Object styles/Text styles/Linked colors	■ ■	■ ■	■ ■	■ ■
Color-mixing models	CMYK, gray-scale, HSB, RGB	CMYK, HSL, RGB	CMYK, gray-scale, HSL, HSB, RGB	CMYK, gray-scale, HSL, RGB
Major color-matching models	DIC, Focoltone, Pantone, Toyo, Trumatch, Web-safe color libraries	Pantone, Toyo, Trumatch	DIC, Focoltone, Hexachrome, Lab, Pantone, Process, SpectraMaster, Spot, Toyo, Trumatch, Web-safe color libraries	DIC, Focoltone, Munsell, Pantone, Toyo, Trumatch, Web-safe color libraries
Illustration Tools				
Beveled, rounded, and mitered corner joins	■ ■	■ ■	■ ■	■ ■
Bitmap/fractal/vector pattern fills	■ ■	■ ■	■ ■	■ ■
Gradient/transparent/PostScript fills	■ ■	■ ■	■ ■	■ ■
Calligraphic/parallel/dimension lines	■ ■	■ ■	■ ■	■ ■
Intelligent connecting lines	■ ■	■ ■	■ ■	■ ■
Gradient/natural-media strokes	■ ■	■ ■	■ ■	■ ■
Align/distribute objects	■ ■	■ ■	■ ■	■ ■
Snap objects to guidelines/grid	■ ■	■ ■	■ ■	■ ■
Snap objects to objects/nodes	■ ■	■ ■	■ ■	■ ■
Combine/break/slice objects	■ ■	■ ■	■ ■	■ ■
Blend/envelope objects	■ ■	■ ■	■ ■	■ ■
Boolean/weld objects	■ ■	■ ■	■ ■	■ ■
Bevel/Extrude/Perspective	■ ■	■ ■	■ ■	■ ■
Clip bitmap to object/Clip object to object	■ ■	■ ■	■ ■	■ ■
Edit/manipulate bitmapped images	■ ■	■ ■	■ ■	■ ■
Apply 2D effects/3D effects to bitmaps	■ ■	■ ■	■ ■	■ ■
Apply plug-ins to bitmaps	■ ■	■ ■	■ ■	■ ■
Text Handling				
Tracking/kerning/leading	■ ■	■ ■	■ ■	■ ■
Flow text between frames/within objects	■ ■	■ ■	■ ■	■ ■
Fit text to path/Wrap text around objects	■ ■	■ ■	■ ■	■ ■
Set columns/bullets	■ ■	■ ■	■ ■	■ ■
Imports				
AI/EPS/WMF	■ ■	■ ■	■ ■	■ ■
CDR/DXF/PDF	■ ■	■ ■	■ ■	■ ■
PCX/Photo CD/Pict (Macintosh)	■ ■	■ ■	■ ■	■ ■
JPG/TGA/TIFF	■ ■	■ ■	■ ■	■ ■
Standard GIF/Transparent GIF/Animated GIF	■ ■	■ ■	■ ■	■ ■
PNG	■ ■	■ ■	■ ■	■ ■
Exports				
AI/EPS/WMF	■ ■	■ ■	■ ■	■ ■
CDR/DXF/PDF	■ ■	■ ■	■ ■	■ ■
PCX/Pict (Macintosh)	■ ■	■ ■	■ ■	■ ■
JPG/TGA/TIFF	■ ■	■ ■	■ ■	■ ■
Standard GIF/Transparent GIF/Animated GIF	■ ■	■ ■	■ ■	■ ■
PNG/Image maps	■ ■	■ ■	■ ■	■ ■
Vector format with URLs	■ ■	■ ■	■ ■	■ ■
Requires plug-in	N/A	■ ■	■ ■	■ ■

(1) Transparent fills refers to true, live, interactive transparencies. (2) From the Windows version of Illustrator 8.0 only. (3) From the Macintosh version of Illustrator 8.0 only. N/A—Not applicable: The product does not have this feature.

function that reports whenever your cursor is aligned to adjacent objects, you'll need a plug-in like Hot Door's CADtools if you want to draw to scale or insert dimension lines.

The beta version we tested did not include a functional version of Illustrator's Kodak colour-management system, so we were unable to test four-colour separations. In addition, Illustrator 8.0 suffered from the slowdowns and crashes we expect from a beta program. Adobe says all these issues will be resolved by the time Illustrator 8.0 ships. Aside from these problems, we are curious to see how well Illustrator's new special effects translate when printed to older PostScript devices; in our tests, when we printed a gradient mesh on a PostScript 2 device, the output displayed artifacts in the JPEG rendering.

Although we'll withhold our final verdict until Illustrator 8.0 ships, its innovative tools and ease-of-use enhancements certainly look very promising. —Luisa Simone

Deneba Systems

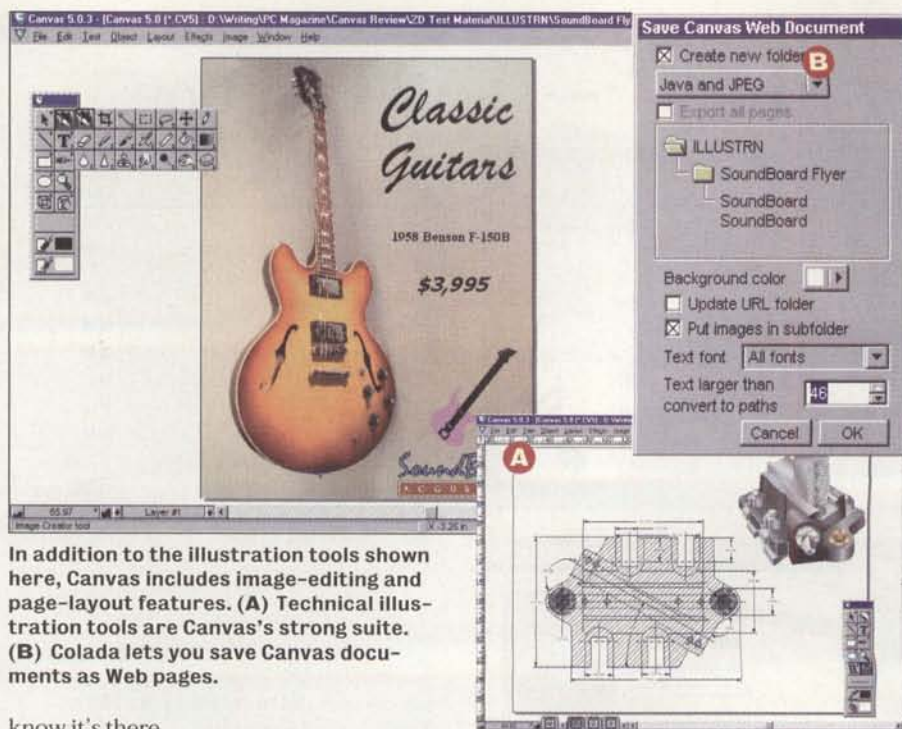
Canvas 5.0.3

\$799 (upgrade, \$249). Pica Software, 03 9388 9588; www.deneba.com

Canvas has carved its own niche by combining its impressive technical illustration tools with image-editing and desktop-publishing features. Chief among the improvements in Canvas 5.0.3 is the addition of Colada, an add-in for publishing Web pages. Although this and other enhancements are noteworthy and Canvas still offers the best set of technical illustration tools in its class, as a general illustration program it falls short of the other packages reviewed here.

Version 5.0.3 includes fixes (first rolled out in an interim 5.0.2 update) for several stability problems. A complete list of the fixes is available on Deneba's Web site. We did not come across any stability problems during our work with the new version, and owners of earlier editions of Canvas 5 are well advised to get the free upgrade. Other features that did not cause crashes but didn't work correctly, such as PostScript errors that occurred during printing, have also been fixed.

In addition to some minor text-handling enhancements, Canvas 5.0.3 integrates so seamlessly with Colada 2.0, Deneba's new Web authoring tool, that you may hardly



In addition to the illustration tools shown here, Canvas includes image-editing and page-layout features. (A) Technical illustration tools are Canvas's strong suite. (B) Colada lets you save Canvas documents as Web pages.

know it's there.

Like Corel's Barista technology, Colada converts existing illustrations or documents into one or a series of Web pages. If the Canvas document contains multiple pages (which is possible because of Canvas's publication and presentation features), the pages can be connected with hyperlinks, and Colada will create an entire Web site from one document. More so, Colada allows you to assign a URL to any portion of an image or illustration to convert it into a hot spot.

Using this version of Colada, you can also zoom and pan vector graphics, create Web presentations from Canvas publications and slide shows, and add animation and sound effects. Since Colada is Java-based, like Barista, no browser add-ins or ActiveX controls are required to view Colada-generated pages.

Colada supports five different output formats: Java only, Java and GIF, Java and JPEG, GIF image with links, and JPEG image with links. Because Colada's output can be a combination of vector graphics, bitmap images and text, the output has a relatively small footprint.

In addition to Colada, Canvas now includes several new features first introduced in Version 5.0.2. A proxy editor has noticeably improved Canvas's performance when you are working with large files. The Transparency Mask feature lets

users create alpha channel masks to work with portions of images. And Canvas's tools now support pressure sensitivity for better results when painting with a stylus.

Although many of these new features are not directly related to illustration, Canvas is best known for its technical illustration tools. Here the program offers several features that others either do not have or rely on third-party plug-ins to deliver. These include Dimensioning Objects, which lets you quickly locate the centre point or measure the area of an object; Smart Lines, which maintains connections when you move the objects that they link together; and Smart Mouse, a drawing tool that automatically snaps lines to the closest point as you draw. Not surprisingly, Canvas performed very well on the technical illustration portion of our tests; though it did not do as well on the artistic illustration section, where Canvas can't compete with innovative tools in Adobe Illustrator, CorelDraw and Macromedia FreeHand.

Canvas began life as a Macintosh product, and although Deneba says sales are now split evenly between Mac and Windows, evidence of its ancestry is everywhere. The Windows user interface is still rough in places, and there is little right-mouse-button support. Deneba's

Professional Graphics

long-term goal is to make both versions nearly identical in terms of interface and features. The next upgrade is due to be released before the end of this year.

As Deneba readily admits, Canvas will not replace such programs as Adobe Photoshop, CorelDraw and QuarkXPress, for example. Instead, Canvas continues to find a home in the SOHO and education markets, as well as in larger companies that do not have full-time design professionals, where its blend of illustration, image-editing, and page-layout features is an attractive alternative. —Will Fastie

Corel

CorelDraw 8

\$899 (upgrade, \$479). Corel, 1800 658 850; www.corel.com



Corel is known for packing a lot into the box, and CorelDraw is no exception, with its hundreds of megabytes of applications, utilities and clip art. But CorelDraw 8 delivers quality as well as quantity. Thanks to improvements in print output and to enhanced productivity tools, CorelDraw has matured.

As with its sister program, Photo-Paint 8 (which is included with CorelDraw), CorelDraw's interface fills every corner with information. Toolbars, current tool properties, status line, roll-up palettes and tabbed docked palettes fit together intelligently, giving the user quick access to controls. You can configure the interface to appear like CorelDraw 7, or even Adobe Illustrator or Macromedia FreeHand, and you can save your personal workspace preferences. The on-screen CorelTutor, comprehensive documentation, and thorough online help provide considerable assistance.

This version of CorelDraw is more efficient. Zoomed views can be named and saved in the Zoom Level window on the toolbar. That way, you can return to that view with a single click-and-drag. Guidelines are now treated as objects, which can be grouped, angled and/or nudged. Undos are saved with your file, so that you can return to earlier versions.

CorelDraw 8 has more interactive tools and procedures that are done directly on the page rather than through dialogs. This

includes greater support for drag-and-drop of effects and colours. For instance, click on an object with the Drop Shadow tool to place the shadow controls, then drag the object to orient and size it. Similarly, use the mouse to drop colours onto the shadow control's two nodes and push on the centre point to set their blend percentages. Such precise, interactive control provides unin-

terrupted editing with immediate feedback. Lens Effects let you selectively apply transparency and other artistic effects to images.

Text tools include columns, bullets, drop caps, hanging indents, linked text boxes and many word processing



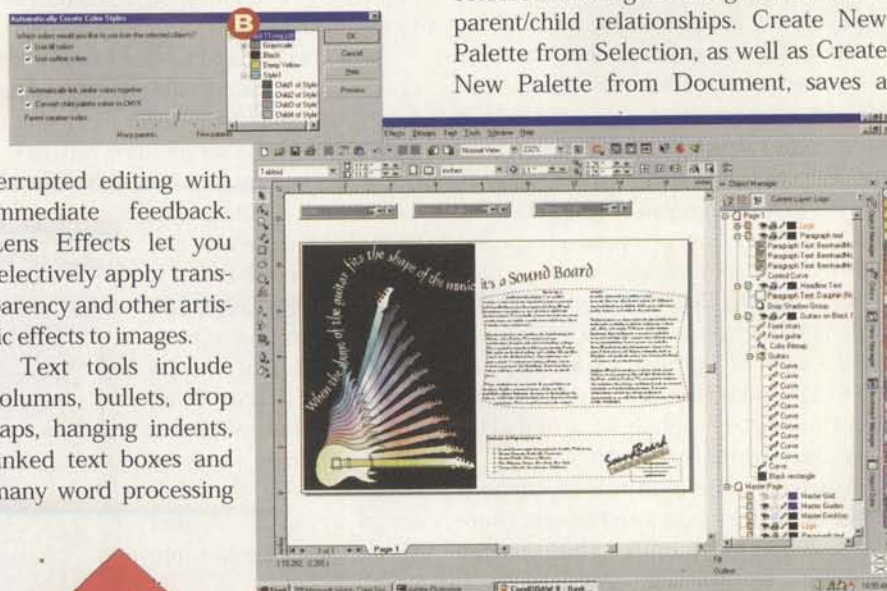
and typography commands. Though you can create and edit text directly on your page, any small change in a large text block causes a delay while the screen redraws, so you'll be better off using the text dialog. CorelDraw has no command to flow text around an object automatically, but with the Envelope tool, any object (including a text box) can be reshaped interactively. The Fit Text to Curve command leaves both the text and its path editable.

Precise numerical controls over size, rotation, and position are on the tool properties bar. But other than the angled guidelines, there's no control over angles. Dynamic dimensioning lines (which can be horizontal, vertical or angular) automatically change measurement values when their linked objects are resized.

Colour options are versatile and powerful, but the controls tend to be dispersed throughout the program. The colour palette can pick up, use and save colours

measured by spectrophotometers. Clicking on a swatch in the on-screen strip displays a box of variations of that colour. Or, you can interactively mix colours and pick up variations in yet another dialog. But you can't specify spot colours by name.

In the Palette Editor, you can create, edit, and save different colour palettes. Auto Create Color Styles picks up all the colours in a design and organises them in parent/child relationships. Create New Palette from Selection, as well as Create New Palette from Document, saves a



CorelDraw has a workspace with an Object Manager and roll-up toolbars. (A) Drop Shadow tool. (B) Create colour styles.

colour palette based on your design. But the three dialog boxes are not integrated.

Print quality has improved significantly. CorelDraw generated crisp, clean output with bright colours that were nearly identical to those of the screen image. CorelDraw 8 uses Kodak Color Management with ICC profiles. In addition to Hexachrome colour support, it includes links to the OPI (Open Press Interface) and DCS (Desktop Color Separations) prepress protocols.

Web tools are almost automatic. URL hot spots are created in Object Properties, and CorelDraw supports a laundry list of export formats including transparent GIF, HTML, Java, JPEG and PNG. The Publish to Internet wizard steps the user through creating HTML or Corel Barista (the Java-based format) pages appropriate for the Web. In our tests, CorelDraw yielded high-quality images.

CorelDraw 8 is a powerful, feature-rich program for artistic and technical illustration for print or the Web. As if this weren't

enough, the suite also includes Photo-Paint 8, CorelDraw 8, and several graphics utilities, making it one of the best values in this roundup. —*SWG and DG*

Macromedia

FreeHand 8

\$679 (upgrade from previous version, \$249; competitive upgrade, \$329); Firmware Design, 1800 060 357; Scholastic, 02 4328 3555; www.macromedia.com

FreeHand is recognised for its ability to maintain perfect colour fidelity between screen and printer. The latest version, FreeHand 8, maintains this edge while adding several key features to its illustration arsenal. Throw in Flash animation and expanded GIF support and you've got a program that's ideal for nearly everyone (except perhaps technical illustrators).

Macromedia loads the FreeHand CD with 493 fonts, more than 10,000 clip art objects and 370 project templates. The manual includes 48 pages of tutorials, and FreeHand also has simple wizards that set page size, drawing style and more.

You build projects on a canvas supporting both multiple pages and layers. There are few drawing primitives, but you can easily combine objects and shape them with a Bezier Pen or FreeHand's excellent new Freeform tool. Double-clicking on an object spawns transformation handles for rotation, skewing and resizing.

FreeHand stores all project colours as chips in the Color List panel. You add colours from included Pantone, TruMatch and other libraries, or by selecting a colour from an imported bitmap or other object with an eyedropper. Imported colours are immediately listed by the colour mode you are currently working in.

Our tests revealed some interesting strengths and weaknesses. On the plus side, FreeHand's Auto-trace tool made short work of copying the outline of an imported image, letting us quickly create an editable vector object—in this case, a guitar. But although FreeHand has some new texture-like styles and very flexible gradient options, it lacks a mechanism, such as Corel's Texture, for creating realistic textures. In addition, although FreeHand's new emboss and shadow features create the appearance of depth, they fall short of a true extrusion feature for creating an actual 3D object.

Still on the plus side, FreeHand's text

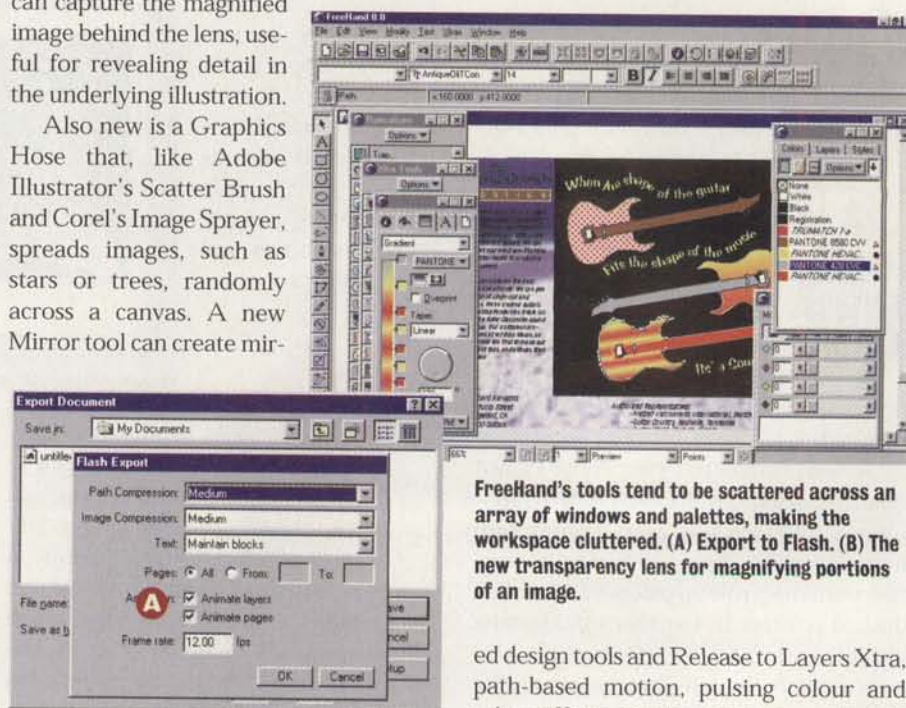
capabilities remain strong. You can attach text to any object, making shaping text around our test images simple, though we had to kern certain letters when angles got sharp. FreeHand can spread larger blocks of text evenly across multiple objects and frames. It includes kerning and leading tools, as well as a spell-checker and find-and-replace functions. You can also insert objects into text and specify standoff distance on all sides.

New in FreeHand 8 is the Lens Effects option, which enables effects such as a magnifying lens and transparency. An image of a glass of red wine, for instance, can darken the object behind it. A snapshot function can capture the magnified image behind the lens, useful for revealing detail in the underlying illustration.

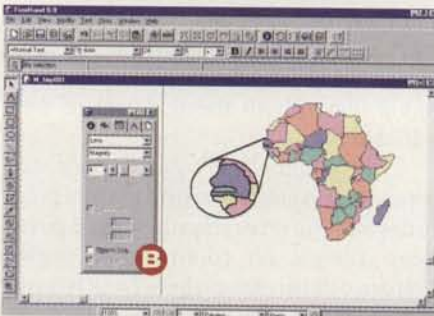
Also new is a Graphics Hose that, like Adobe Illustrator's Scatter Brush and Corel's Image Sprayer, spreads images, such as stars or trees, randomly across a canvas. A new Mirror tool can create mir-

you can't measure diameter or radius, or create dynamic dimension lines as you can in Canvas and CorelDraw, for example.

FreeHand's Web features start during design, when you can choose colours from a Web-safe colour library. Improved output options include PNG support and the ability to dither and specify palettes for GIF files. Still, comparison tests show that other programs create GIFs with higher colour fidelity. FreeHand's key Web-related feature is its support for the popular Flash animation format. With FreeHand, you get complete control over parameters such as the path, image compression, and frame rate. Combined with FreeHand's automa-



FreeHand's tools tend to be scattered across an array of windows and palettes, making the workspace cluttered. (A) Export to Flash. (B) The new transparency lens for magnifying portions of an image.



ror images of an object or multiple copies distributed along the axis of a circle.

For technical illustrators, FreeHand 8 has little new to offer. You still don't have the ability to set drawing scale, and though you can monitor object size while drawing,

ed design tools and Release to Layers Xtra, path-based motion, pulsing colour and other effects can be easily converted to compact Flash.

FreeHand offers several useful output features, including printer profiles and a Collect for Output feature that places required components, such as fonts and embedded images into one directory for transfer to a service bureau. In addition, output tests revealed that FreeHand has lost none of its printing prowess. It produced crisp, colour-accurate output consistent with the screen display.

FreeHand may not be the most feature-rich professional illustration program, but its dead-on colour output and Flash support make FreeHand one of the top programs for artistic illustration.

—Jan Ozer ■

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***DEALER ENQUIRIES WELCOME**

Budget Notebooks



Feature-packed Road Warriors for under \$3000.

By Chris Ralph

Cheaper and more powerful—a familiar refrain to desktop users, especially this past year; now the trend has made its way to notebooks. Notebooks still cost more than desktops, but they're rapidly coming down in price. And as this review proves, saving a little money on a value-priced notebook doesn't mean you have to settle for a second-rate machine. The notebooks in this feature offer Pentium MMX processors or the new AMD K6-2 300MHz processors as well as hard disks up to 3.8GB in size and displays of 12.1 inches. We reviewed seven notebooks for this test; all are feature packed and inexpensive.

Acer Computers Australia

Acer Extensa 500DX

The Extensa is a neatly put together unit with some innovative features, such as the external controls for the

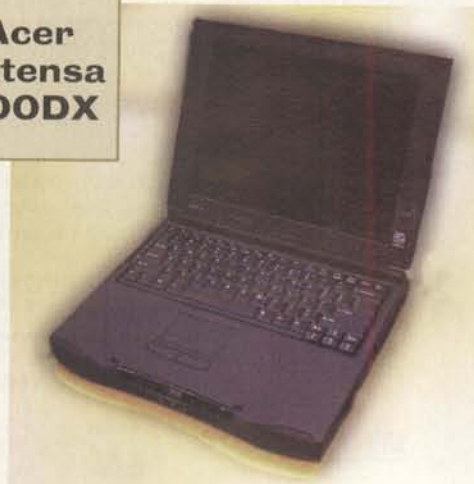
CD-ROM that allow audio CDs to be played without powering up the whole unit. The notebook base is rock solid, with a well-supported keyboard showing no sign of the bouncing evident in notebooks of poorer construction. Keyboard tactile feedback is very good, allowing confident touch-typing. Locations of all the controls are quite well placed, the PC Card ejection buttons in particular giving no trouble when used to push the cards out to a point where they can be grasped securely by the fingers.

The screen panel has somewhat more flex than we are used to and displayed noticeable rippling of the image when pressure was applied to the rear of the display panel. The image quality was good, with strong colour despite the DSTN screen. Screen control was performed from the keyboard via the cursor arrows in conjunction with the Fn key. The large

well-positioned speakers, which are located in the front corners of the notebook's base, provided good sound reproduction for both system sound emphasis and audio CD playback.

The manual was well laid out with most information easy to locate. The provision of a system recovery CD

**Acer
Extensa
500DX**



Budget Notebooks

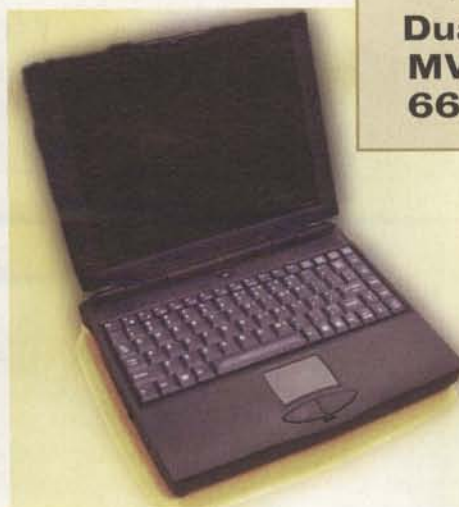
makes recovery from a hard disk fault less painful than a full reinstall of Windows from scratch. There is no provision for a rear I/O port protection flap, nor were there any keyboard angle adjustment feet.

During testing we did notice some scrambling of the display in one run of the video performance tests in WinBench 98, but were unable to duplicate the problem in later runs. The Extensa failed the Winstone 98 Task Switching II test, in common with most of the rest of the field. This is a documented problem with Windows 98 or when Internet Explorer 4 is installed with Windows 95. No other problems were encountered.

The Acer was one of the leaders in Winstone 98 using its 16-bit display driver, although this performance fell off slightly under the 24-bit driver. It achieved a score of 15.7 in Business Winstone 98, with a strong score of 77.3 in the Graphics Winmark test. The Extensa had by far the best hard disk performance of the field, with scores of 980 and 2650 in the Diskmark Business and High-End tests. The battery used in the Extensa is a Nickel Metal Hydride (NiMH) unit, rated at 9.6V and 3,500mAh capacity which, in conjunction with Acer's Heuristic Power Management, should give substantial life

to the notebook. From our tests it achieved a rating of 2 hours and 33 minutes, the best in this round-up. Be aware that our tests really hammer the battery and you could expect much better battery life in normal operation.

Overall, expect a lot from this \$2799 notebook—it oozes quality and performs very well. Users opting for a notebook in preference to a desktop will



**Dual's
MVA-
6690**

want the get the TFT screen instead, for extra clarity and less eye strain. This unit comes highly recommended.

Acer Extensa 500DX. Price: \$2799; Acer Computers Australia; Ph: 02 9870 1999, Fax: 02 9878 6227; www.acer.com.au

Dual Technologies

Dual MVA-6690

The Dual MVA-6690 is an attractive notebook with curves dominating its look, but it has not lost any sturdiness as a result. Inside the notebook, Dual have also opted for the additional speed of the AMD-K6 3Dnow processor, and while its performance in isolation was good, slow hard drive performance slowed the system overall. Rounding out the major system components is 32MB of RAM, a 2.1GB hard disk and an 800 x 600 capable TFT screen.

The right-hand side of the notebook contains the 3.5 inch floppy disk drive and CD-ROM, with the left-hand side including speakers, headphones and microphone ports along with two Type II PCMCIA slots, InfraRed and USB ports too. In all, connectivity is quite comprehensive, with the rear of the notebook including the familiar interfaces of VGA out, serial, parallel and a PS/2 port. This is a slim and light notebook when compared to some of the others tested, but would still weary shoulders by the day's end.

Opening the top reveals a well-organised keyboard and a clear, but very slightly dark TFT screen. The hinges holding

Editors' Choice

● Acer Extensa 500DX



There were several contenders for the award this month. As always, whenever we test

notebooks, the competition is fierce. Once we eliminate the obvious non-winners, we are left with trying to pick an overall winner from a myriad of tests including performance, battery life, features and price. We were looking for a notebook with the right features, good performance, excellent reliability and battery performance—also very high in this month's Editors' Choice selection criteria was a great price. We found all these features in the notebook from Acer. The Extensa definitely has the features, quality, battery life

and price to make it an excellent buy. Priced at just \$2799 it is also the cheapest notebook (although it does lack a TFT screen). Overall however, its performance, features and price make it the best value notebook of the review, and we feel it therefore deserves to be awarded the Editors' Choice. The other notebooks from Dual, FIC, Formosa, Pioneer and Integral also offer great performance at very reasonable prices. Battery life tended to suffer in these units as they have opted for faster (and therefore more battery hungry) CPUs, which gives little comfort to those taking these systems on the road, as battery life is one of a notebook's most important features. Overall, however, the notebooks from Pioneer, Integral and Formosa represent very good combinations of features, price and speed and deserve a close look.

Budget Notebooks

the screen are strong and sturdy. The display is an 800 x 600 pixel 12.1in TFT panel, which had a good viewable angle in the horizontal plane, but was not as good as some of the other units in the vertical plane. The range of adjustment of the brightness was barely discernible, but the default was adequate for all the indoor lighting conditions we tested under.

The keyboard is raised slightly to be on the same level as that of the ample palm rest, with the keys themselves very pleasant to type on. Travel is very good and a very tactile "clicky" feel is present on the Dual MVA-6690's keyboard. The increased depth of the palm rest allows for a large touchpad which also has a good feel and operation. The buttons are very strong, with very little downward movement, but excellent operation. Stereo speakers resided at the rear of the notebook. Aurally, they were reasonable, but competing with the noise of the fan, they lacked strength. A microphone is located at the top of the keyboard next to the power switch. The power switch is centrally located at the rear of the notebook, with eight LEDs providing system feedback.

The battery supplied with the MVA-6690 is a Li-ION DC Model No:ME202BB, and is rated at 11.1V and hung on for a satisfactory 1 hour 40 minutes in our battery torture test. We consider that a notebook must score better than 1.5 hours to gain a satisfactory rating, and around two hours would be considered good. Anything in excess of 2.5 hours is excellent. We even ran the test several times, allowing the battery to charge overnight to condition the battery, and this was the best result we obtained. Admittedly, our battery test does not reflect real-life usage, but under the same test, the Acer managed almost one hour more than the Dual.

Performance was another area where the MVA-6690 was a little slower, but still quite acceptable. The main culprit for slowing the system was the hard drive, which had the lowest scores of all the notebooks tested. It managed only 782 in Business Diskmark and 1920 for the High-End Winmark. This compared to scores of 980 and 2650 for the Acer Extensa in the same tests. The CPU was certainly a good performer pulling in

scores of 525 and 942, but despite great scores in Graphics Winbench the Dual MVA-6690 could only manage a score of 1 in Final Reality. Dual supplies a carry case with the notebook and with a price of \$2995 we feel it is a good buy, with the only detractor a noisy fan.

Dual MVA-6690. Price: \$2995; Dual Technologies; Ph: 03 9887 7888, Fax: 03 9887 7868; www.dual.com.au



**FIG's
FirstLite
1130T2**

Formosa International Group

FirstLite 1130T2

We received from Formosa the FirstLite 1100 series notebook, with a brand new AMD-K6 3Dnow processor lying within. The system also came with 32MB of RAM and a 2.1GB hard drive for plenty of storage. A 24x CD-ROM is fitted as standard for superior performance when retrieving data or loading applications. Designed to boost notebooks video performance is the new S3 Virge/MX video processor, which in the FirstLite 1100 is combined with 4MB of SGRAM for the fastest video performance of this review.

The case of the FirstLite 1100 is black in colour and looks clean and relatively uncluttered, especially the front edge, which is smooth and clean. Opening the lid reveals a keyboard that is set well back from the front, with a large palm rest for support while typing. Slightly to the left of centre is a touchpad that we found responsive and easy to use. It includes the added functionality of a "double tap" that produces the same result as a double click from a mouse. Under the bright and clear 800 x 600

12.1in TFT display is a row of four status LEDs to indicate snooze mode, battery status, AC connection status and hard drive activity. Two LEDs are on the top cover of the notebook providing hard drive and power status feedback. On each side of notebook are stereo speakers, which proved very good for system sounds and CD style music as well.

The left-hand side of the case provides the access point for the AC power adaptor, with the other side including support for a 3.5in floppy disk drive, CD-ROM and two Type II PCMCIA slots. The rear of the system yields ports for external VGA, headphones, microphone, serial, parallel, PS/2 (keyboard or mouse) and a USB port. The main system battery, a DC 11.1V 5600mAh Li-Ion, can be removed from the bottom of the notebook to insert a fresh one. From our tests it may pay to have a spare as Battery mark reported a run down time of just 1 hour and 45 minutes. The bottom of the case also has a fan to keep the 300MHz processor cool, which from our experience can get very warm indeed.

The FirstLite 1100 showed very good performance in most of the benchmarks, scoring 15.6 in Winstone 98. As previously mentioned the FirstLite 1100 had very strong video performance, being the only notebook to crack the 100 barrier in Graphics Winbench 98 with a score of 104. The performance of the hard drive was okay, but nothing stellar with the CPU making up for it with scores of 599 and 95, which was as strong as the Pioneer. Where the FirstLite 1100 really shone was in the 2D and 3D Final Reality test in which the notebook scored 1.83, well above its nearest rival.

With strong performance and solid build quality the FirstLite 1100 is a good value notebook, its battery life could be improved however, but overall the package is worth a look as it includes Windows 98 and Lotus SmartSuite 97 as standard.

FirstLite 1130T2. Price: \$2980; Formosa International Group; Ph: 07 3846 7976, Fax: 07 3846 7878; www.fig.com.au

First International Computers

Leo DESIGNote 6100 Series

This was one of the lighter notebooks in the review, weighing in at under the magical 3kg mark. While not in the same class as the super-light notebooks, it doesn't sacrifice I/O capability to get there, although the effect of such weight trimming is obvious in places like the keyboard, which flexes with even light typing pressures. Lots of honey-combing in the case also lightens the unit, while providing ample airflow through the notebook's case. Inside you will find a Pentium 233MHz MMX processor and 32MB of RAM. Storage is handled by a 2GB hard drive.

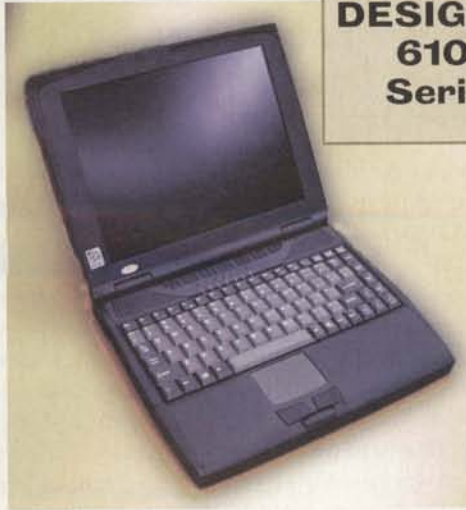
The DESIGNote is a very straight forward but stylish design, and the user can do little except swap the drive modules in the multi-purpose bay. Upgrading the RAM is even considered beyond the capabilities of the user, and so is not even documented in the manual. Looking under various hatches, we could not see where the RAM SoDIMM slot was located. Even lifting the keyboard provided no clues.

Apart from its flexibility, the keyboard was fairly standard in layout, except for the provision of all three levels of low-power operation on the F2 through F4 keys in conjunction with the Fn key, i.e. Standby, Suspend and Suspend to Disk. Display brightness and contrast and speaker volume and mute are located on the cursor and page control keys. A decent sized touchpad is positioned slightly left of centre of the palm rest, although the display panel catch pokes up above the level of the case and interferes with the touchpad buttons operation at certain angles.

The multi-purpose bay is located in the right front edge of the base, and can accommodate either a floppy disk drive or a CD-ROM. When the floppy disk drive is displaced by the CD-ROM, it can be connected to the notebook's parallel port using the supplied cable. The left side of the base holds the two PC Card Type II slots, protected by spring-loaded covers. Card ejection is via push buttons which lock down when not in use. The battery is also located on the left

side of the base, held in place by a sliding cover.

The right side of the base has the removable hard disk held in place by another sliding cover, but the cover is locked in place by a spring clip. The four audio jacks are positioned towards the front of the right side. Between the audio jacks and the hard disk is a blank for the RJ-11 connector for the internal modem and the



**Leo's
DESIGNote
6100
Series**

lens for the IrDA port. The rear of the notebook houses the standard I/O ports, consisting of the serial, parallel, VGA, USB and keyboard/mouse ports. Spring-loaded clamshell covers protect the docking station expansion bus connector.

The DesignNote was slightly below average in performance, but that was expected with the slower CPU. It achieved a Winstone 98 test result of 13.9, and a Graphics Winmark of 76.9, which was below the Acer, another Pentium based system. Both of the WinBench 98 Disk WinMarks were also below average, but only slightly, and still provide a good level of speed and throughput. The CD-ROM fitted to this notebook had the distinction of scoring the highest result in WinBench CD-ROM WinMark test, with its Final Reality score just above the average scoring 1.21.

The score returned by BatteryMark 2.0 for the DesignNote 6100 Series was a fraction below the

2 hour mark with a time of 1 hour and 59 minutes. This was the third placed notebook in terms of battery performance, delivering just that little bit more than the other clone units. Overall it would prove adequate for use away from mains power, especially as "real-world" use is likely not to drain the battery at the same rate as our tests.

Leo DESIGNote 6100 Series. Price: \$2995; First International Computer; Ph: 02 9870 8077, Fax: 02 9870 8177; www.fic.com.tw

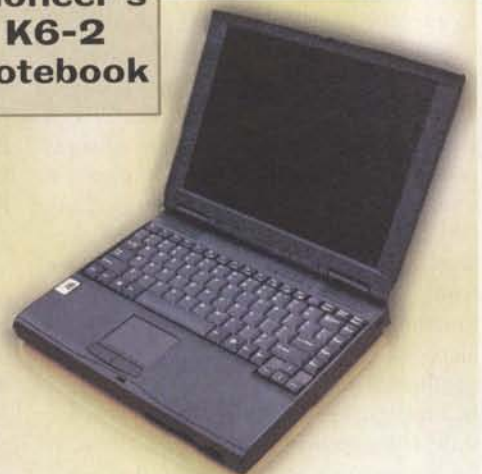
Pioneer Computers

Pioneer Notebook

Like a number of the other vendors Pioneer have opted for an AMD-K6-2 3Dnow processor running at 300MHz to power their notebook. This paid off with the system flying through our tests in very quick time, producing some of the better scores especially in the CPU tests. The system came to the Lab with 32MB of RAM and a 3GB hard drive and therefore offers essentially the same configuration as the other invitees did. The Pioneer system is priced at \$2899, making it quite attractive.

The unit itself is quite plain in a charcoal colour case that did not offer as much rigidity as that of the Acer systems, but is sufficient to prevent accidental damage to the screen of underside of the unit. The left side of the notebook caters for two Type II PCMCIA cards and as well as the power button and a locking mechanism to prevent theft.

**Pioneer's
K6-2
Notebook**



Notebook Performance

Longer bars indicate better performance.

	Winstone 98	Graphics WinMark	Business Disk WinMark	High-End Disk WinMark	CPUmark32	FPUmark	Battery Life (h:mm)
Acer Extensia 500DX	15.7	77.3	980	2650	429	914	2:33
DUAL MVA-6690	14.8	99.2	782	1920	525	942	1:40
Formosa FirstLite 1100	15.6	104	801	2140	599	950	1:45
Leo DesignNote 6100	13.9	76.9	818	2260	429	905	1:59
Pioneer Notebook	16	64.1	883	2420	615	947	1:34
Prodigy Notebook	18.8	78.9	894	2630	625	970	1:46
Average	15.5	81.2	852	2304	518	932	2:00

The front of the case is bare, but includes a 3.5in floppy disk drive. The right side of the case is where you will find the IrDA port and CD-ROM drive. There is also an analogue volume control for the stereo speakers embedded just behind the keyboard in the rear of the case.

Opening the cover reveals a well layed out keyboard, with the majority of keys where you expect to find them. Some, like the Ctrl key, are out of place, which can frustrate people very used to a particular keyboard layout. The arrow keys are in the correct position and offset from the rest of the keyboard, so that confusion over what key you are depressing does not arise. The trackpad is very good, providing good feedback and is easy to operate with the lightest of touches. Again a "double-tap" on the trackpad will produce the same results as a "double-click" from the left-hand mouse button. The two trackpad buttons are arranged next to each other just below the pad itself, with a soft but positive click being felt from both.

The 800 x 600 capable 12.1in TFT is clear, but despite pushing the brightness control to the highest setting, the screen seemed a little dark in the corners (though no more than any of the other clone units). A welcome beep emanates from the speakers while the various function buttons are in use, in order to alert you that you are hitting the right combination of keys. Six LEDs just behind the keyboard, with hard to see little icons, provide a measure of feedback regarding the status of the note-

book. At the rear of the system and behind a protective flap, are the usual I/O ports of Parallel, Serial, VGA Out, USB, a PS/2 port for a mouse or keyboard. The DC power connector is also supplied from the rear of the notebook. In all, the Pioneer notebook offers a feature set similar to the other systems, and in most cases provides ample power and flexibility to cater for most users.

As previously mentioned the Pioneer was one very keen performer zipping along steadily in the majority of categories. It managed a very respectable 16.0 in Winstone 98, but fell behind slightly in the Graphics Winmark test with a score of 64.1. The hard drive results were very good coming in just behind the Hallmark system, but still a measure behind the very fast Acer Extensia.

A score of 1.07 in Final Reality is not likely to create much joy for gamers, but notebooks are not really game platforms. The one big detractor from an otherwise very likeable notebook is a very poor battery life score of only 1 hour and 34 minutes.

Pioneer Notebook. Price: \$2899; Pioneer Computers; Ph: 02 9690 2888, Fax: 02 9690 0333; www.pioneercomputers.com.au

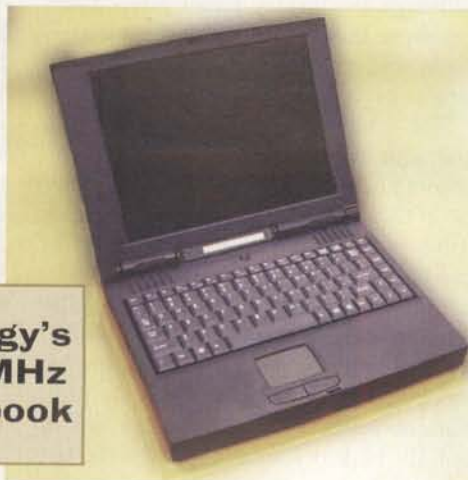
Integral Computers

Prodigy Notebook

The Prodigy from Integral Computers is a speedy performer and well-featured note-

book using the same 300MHz AMD processor as a few of the other systems reviewed. We did strike some problems running the CPU test of Winbench, which surprised us greatly, as the vast majority of systems have no problem with this test at all. Otherwise the system sped its way through the tests in first place, finishing second or third when not first. At \$2995 the price is good, with the Prodigy notebook coming with a bonus 64MB of RAM, 32MB more than the others we saw.

The dark grey case was slightly larger than an A4-sized sheet of paper. A small LCD status display was set between the hinges and providing iconic representations of system activity. A speaker was located each side of the LCD display, with the microphone set high up on the right-hand side of the screen. We had no problems playing audio files, with the speakers providing good quality feedback.



**Prodigy's
300MHz
Notebook**

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- Business Process Re-engineering
- Systems Integration

RMIT Innovation Ltd

ACN 004 882 382

Room 21, Level 1 Building 253
RMIT Bundoora East
Plenty Road, Bundoora 3083

Freecall 1800 247 267

Fax (03) 9925 6195
email: innovation@rmit.edu.au

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UNIVERSITY

SUMMARY OF FEATURES

Budget
Notebooks

Product	Acer Extensa 500DX	Dual MVA - 6690	Firstlite1130T2	Leo Designnote 6100
Price	\$2799	\$2995	\$ 2980	\$2995
Distributor	Acer Computers Australia	Dual Technologies	Formosa International Group	First International Computer
Address	112-118 Talavera Road North Ryde 2133	378 Burwood Highway Burwood East Victoria 3151	50-52 Vulture Street West End Queensland 4101	25-27 Paul Street North, North Ryde NSW 2113
Phone	02 9870 1999	03 9887 7888	07 3846 7976	02 9870 8077
Fax	02 9878 6227	03 9887 7868	07 3846 7878	02 9870 8177
Web address	www.acer.com.au	www.dual.com.au	www.fig.com.au	www.fic.com.tw
Warranty	1 year RTB and 1 year ITW	2 years	1 year parts & labour RTB	1 year RTB; optional additional 1 or 2 years at purchase time
System Features				
Processor Type & speed	Intel Pentium MMX 233 MHz	AMD-K6 3D 300 MHz	AMD-K6 3D 300 MHz	Intel Pentium MMX 233 MHz
Processor upgradeable or co-processor option?	No	Intel MMX 233, MMX 266	Yes	No
BIOS	Acer V3.0 Acr86p6c 4.30 V3.2	SystemSoft 1.01.28	SystemSoft Mobil Pro 1.01	Phoenix BIOS 4.0 Release 6.0
Battery Type and rating	Wi Mh 9.6V DC 3500 mAL	"Li-ION 11.1 VDC"	"Li-ION 5.6AH"	"Wi Mh 9.6V DC 4500 mAL"
Drives				
Floppy Drive configuration	3.5in	3.5in	3.5in	3.5in
Hard drive model	HITACHI DK226A	TOSHIBA MK2104MAV	HITACHI DK226A-210	FUJITSU MHD 2021 AT
Hard drive capacity	2.16GB	2.1GB	2.1 GB	2.1GB
Hard drive interface	IDE	EIDE	EIDE	EIDE
Hard Drive Removeable?	YES	YES	YES	YES
Memory				
System RAM as tested/ Max	32MB/ 128MB	32MB/ 128MB	32MB/ 128MB	32MB/ 128MB
Secondary RAM Cache/Max	512KB/ 512KB	512KB/ 512KB	512KB/ 512KB	512KB/ 512KB
Expansion & Video				
PCMCIA slots	2 x Type II or 1 x Type III	2 x Type II or 1 x Type III	2 x Type II or 1 x Type III	2 x Type II or 1 x Type III
Ports: (1)	1 x serial, 1 x parallel, 1 x PS/2, 1 x VGA	1 x serial, 1 x parallel, 1 x PS/2, 1 x VGA	1 x Serial, 1 x Parallel, 2 x PS/2, 1 x USB, 1 x VGA	1 x Serial, 1 Parallel, 1 x 1 x PS/2, 1 x VGA
Video Bus	PCI	PCI	PCI	PCI
Video accelerator?	NM2097-B	Chips and Technologies 69000	S3 Virge/MX	NeoMagic, MagicGraph 1282vt
Video memory options (fitted)	2MB	2MB	4MB	1.52MB
LCD Type	DSTN	TFT	TFT	TFT
LCD size (WxH in mm)	245 x 185	245 x 185	245 x 185	245 x 185
External resolutions and colour depth:	640x480: 256, 64K, 16.7m 800x600: 256, 64K, 16.7m 1024x768: 256, 64K, 16.7m 1200 x 1024: -	640 x 480: 256, 64k, 16m 800 x 600: 256, 64k, 16m 1024 x 768: - 1200 x 1024: -	640 x 480 : L56, 64, 16 800 x 600: L56, 64, 16 1024 x 768: - 1200 x 1024: -	640 x 480: 256, 32k, 64k, 16.7m 800 x 600: 255, 32k, 64k 1024 x 768: 256, 1200 x 1024: -
Notebook Size WxDxH (mm)	48 x 310 x 255	50 x 305 x 242	302 x 249 x 46	45 x 306 x 245
Notebook Weight Kg	2.95kg	3kg	3kg	2.5kg
Multimedia Options				
CD ROM Model	TEAC CD - 220EA	TEAC CD - 220 EA	TEAC CD - 224E	Toshiba XM - 1802b
Interface	IDE	IDE	IDE	IDE
Speed	20x maximum	20x	24x	12x
Soundcard Model	Yamaha OPL3 - 5A	Yamaha Audio	ES1869 PnP Full Duplex	Yamaha OPL3-5a
16-bit/8-bit	16 bit 44.1khz	16 bit 44.1khz	16-bit, 44.1kHz	16-bit, 44.1kHz
Wavetable/FM Synthesis	FM	FM	FM	FM
Sound card Ports (1)	Mic, Line-in, Line-out.	Mic, Headphones (Hdph), Line-in	Mic, Hdph	Mic, Hdph, Line-in, Line-out
Integrated speakers	Yes	Yes	Yes	Yes
Integrated microphone	Yes	Yes	Yes	Yes
Other Hardware Options Fitted	LT WIN Modem	NA	NA	USB; cable for concurrent use of FDD and CD-ROM
Software supplied	Windows 98	Lotus SmartSuite 97, Norman Antivirus, Win 98	Windows 95, System drivers	Windows 95 or 98
Accessories	Acer Utilities: Notebook Manager, Sleep Manager, Safe Off, Quiet Boot	USB CCD Camera	External charger, carry case, user manual	Carry bag and cover protector

Budget Notebooks

Pioneer AMD K6-300	Prodigy Notebook
\$2899	\$2995
Pioneer Computers	Integral Computers
Unit 17, 17-21 Bowden St Alexandria NSW 2015	22 Dehavilland Road Mordialloc Vic 3195
02 9690 2888	03 9580 4088
02 9690 0333	03 9580 4188
www.pioneercomputers.com.au	www.integralcomputers.com.au
1 year	1 year parts & labour RTB
AMD-K6 3D 300 MHz	AMD-K6 3D 300 MHz
No	K6-2 300 Mhz
SystemSoft 1.01	Phoenix V4.05.1
"Ni-Mh 10 show pack or Li-Ion 6 show pack"	Lithium Ion smart battery
3.5in	3.5in
HITACHI DK227A-31	FUJITSU MHA2021AT
3GB	2.1GB
EIDE	EIDE
YES	YES
32MB/ 96MB	64MB/ 128MB
512KB/ 512KB	512KB/ 512KB
2 x Type II or 1 x Type III	2 x Type II or 1 x Type III
1 x serial, 1 x parallel, 2 x PS/2, 1 x VGA	1 x serial, 1 x parallel, 1 x PS/2, 1 x IrDA, 2 x USB, 1 x TV-out, 1 x ext port
PCI	PCI 64 bit
Trident 9685 (Cyber 9385) 65555 Super VGA	S3 M5 3D acceleration engine
2MB	2MB optional 4MB
TFT	TFT
245 x 185	211 x 158
640 x 480: 256, 64k, 16m 800 x 600: 256, 64k, 16m 1024 x 768: 1200 x 1024:	640 x 480: 256, 64k, 16M 800 x 600: 256, 64K 1024 x 768: 256 1200 x 1024:
50 x 295 x 235	310 x 240 x 45
3.2kg	3.4kg
MATSHITA USDA150	TOSHIBA CD-ROM XM-1702B
IDE	IDE
10x	24x
ES1869 PnP AudioDrive	Yamaha YMF715e
16 bit 44.1 khz	16-bit
FM	Software wave table
Mic, Line-out	Mic, Line-in, Phone/Speakers-out
Yes	Yes
Yes	Yes
Modem, PCMCIA network card	Ps 2 to AT connector TV-out connector
Windows 98, HD utilities, sound card drivers	Windows 98, CD-ROM Drivers Electronic Manual
	Carry bag

The keyboard was set well back from the front of the notebook, and the keys provided good tactile feedback, with no detectable sideways wriggling while typing, although there was some flexing of the keyboard in the top left corner, where support seemed to be a little lacking. All the page movement keys had their own dedicated keytops, with two Ctrl keys for users familiar with conventional keyboards. There were two Windows 95 menu keys and a single context menu key. The keyboard did tend to heat up a little with extended use, as the CPU's heatsink is a large aluminium plate that supports the keyboard. The touchpad worked well without being too sensitive, and the buttons located below the touchpad were clicky without being heavy.

Upgradability was good, with two SoDIMM slots for EDO RAM under a small hatch beneath the notebook, accommodating up to 96MB. The 2GB IBM hard disk was a push-fit, after undoing two small screws holding the cover down. Two PC Card slots hid behind a swing-down cover at the rear left of the base. PC Card services had not been initialised when we tested our PC Card in the slots, but after running the setup wizard and rebooting, the card was detected without any trouble. After inserting the Windows 95 CD when requested and restarting the notebook once more, the card performed as expected. Ample room was provided for thick fingers to eject the cards.

The Toshiba 10-spin CD-ROM and floppy diskette drive shared an option bay, which can also take a second battery. If concurrent use is required for both diskette and CD, the floppy disk drive can be attached to the parallel port by a supplied cable and accessed in this way. The process is completely transparent to the user, as no extra drivers or special procedures are required. The battery was a Li-Ion 10.8V 3600mAh device which, while it had no built-in charge gauge, used a bar graph on the LCD status display, or the system agent on the taskbar, to show charge level.

Performance of the notebook was excellent, with a Business Winstone 98 score of 18.8. The WinBench 98 Graphics WinMark score was a little

How We Tested—Budget Notebooks

The tests we performed included the new use of Winstone 98 and WinBench 98 Test suites from Ziff-Davis. The results obtained are not comparable with any previous ZD test as the method of calculating the results has changed, as have the included applications that the test suites run. For instance, the base system used to generate the results has changed.

The WinBench and Winstone are now quite closely linked. Indeed WinBench's Disk and Graphics tests utilise ZD's "Playback Technology" which simulates running actual applications rather than the totally synthetic tests employed in versions of WinBench prior to 1997. ZD's proprietary playback technology acts rather like a subsystem-level VCR, playing back the previously recorded subsystem-level activities the Winstone 98 applications made while executing the Winstone scripts. Using ZD-proprietary tools, logs of the graphics and disk activity of the Winstone 98 applications are logged. These logs contained every graphics (or disk) function the applications performed. When a playback test starts, the benchmark uses these logs, which come on the PC Benchmarks CD-ROM, to literally play back the stored calls. WinBench 98's WinMark tests for the disk and graphics subsystems are playback tests.

WinBench 98 is a subsystem-level benchmark that measures the performance of a PC's graphics, disk, processor, video and CD-ROM subsystems in a Windows-based environment. WinBench 98's tests are all 32-bit, and so can only run on Windows 95 and Windows NT systems. WinBench 98's new Graphics Playback technology reproduces the graphics operations the Winstone 98 business and high-end applications perform, affording you a better-than-ever measure of your PC's graphics subsystem. WinBench 98 returns the following main results that provide an overview of a PC's graphics, disk, processor and CD-ROM subsystems' performance: Business Graphics WinMark 98 and Business Disk WinMark 98, High-End Graphics WinMark 98 and High-End Disk WinMark 98, CPUmark32, FPUMark, CD-ROM WinMark 98.

The Winstone 98 Base Machine

Business Winstone and High-End Winstone (HEWS) have the same base machine in Winstone 98, a Dell Dimension P5-133 with 32MB of RAM. The screen resolution is 1024 x 768 using 16-bit colour. The base machine's operating system is NT.

BatterMark 2.0

As with our previous DOS-based battery test software, we dis-

abled hibernation and suspend modes to force the notebooks to completely drain their batteries. The BatteryMark software runs a similar suite of software to the other Ziff-Davis tests. Two type of runs are configured in the software. The first is a battery conditioning mode, and this forces a greater load on the battery, while timing the runs for the reports. Once two consecutive conditioning runs have reported less than five percent difference in times achieved, the software recommends changing to Life-Test mode.

However, the Life-Test requires a hardware device to stop the notebook from going to sleep. Ziff-Davis have a device for sale (\$200 each) which presses the keyboard every 15 seconds to achieve this result. The RMIT Technisearch PC Test Lab think we can develop our own device at a substantially reduced cost, but our prototype did not work as planned. Back to the drawing board!

The battery life results this month are those reported from the conditioning runs, and while the results are not as great as they would have been had everything gone according to plan, they are comparable with the other PCs in this test, as all the notebooks were tested identically. Like our DOS-based test software, these are all worst case scenarios, and actual battery life will be substantially greater.

Final Reality

Developed by VNU European Labs and Remedy Entertainment, Final Reality has been developed in response to consumer demand for an accurate benchmark for the increasing number of applications using 3D graphics.

Final Reality is the most comprehensive and effective consumer and manufacturer 3D test suite available. It enables consumers to test the effectiveness of their existing PC in processing and rendering 3D images, and provides a standard against which a new PC can be judged. It can be downloaded from the Final Reality web site on www.final-reality.com.

A one click installation, Final Reality runs a series of tests which push 3D graphics to the absolute limit. The standard of on-screen graphics which accompany this test are higher than any previously seen, and represent a major advance in real-time 3D graphic creation. Once the four-minute test is complete, a simple overall score and a full report giving a more advanced analysis indicate how effectively the PC handles 3D graphics.

below average with a score of 78.9. The hard drive scores were very good—still not as swift as those of the Acer Extensa—but very good nonetheless. The Final Reality score was about average, but again the battery test showed poor results for the clone notebook, with a time of 1 hour and 46 minutes

recorded. Note that by the time you read this, the Prodigy notebook will come standard with a 4MB S3 M5 VGA video subsystem, which should boost its video performance somewhat.

Integral Computers supplied a vinyl carry case to protect the Prodigy, and this had an outside pocket for carrying

the power supply and a few additional accessories. Inside, there was a thin pocket for the manual, plus some diskette pouches and pen holders.

Prodigy Notebook. Price: \$2995; Integral Computer; Ph: 03 9580 4088, Fax: 03 9580 4188; www.integralcomputers.com.au ■

WIN one of First International Computer's Portable Computing Group's 6100 Series notebooks. Valued at \$2,990.



Praised by Taiwan Government with their Award of "it's very well Made in Taiwan" for their 6000 Series last September, FIC's Portable Computing Group will be extending their family of products by presenting another cost-effective, high-performance mobile computing notebook know as the 6100 Series. The 6100 Series features Intel's Pentium MMX CPU, which meets Intel's prediction for the upcoming segment 0 marketing trend.

Apart from its ultra slim profile the 6100 Series incorporates a complete balance of performance and portability. It is recognised as the ideal solution for users who are seeking the advantages of a computing device, which is highly portable and built with extreme capabilities, yet with a lower cost. For the ultimate in convenience, it performs well with Windows 98 and Windows NT.

The 6000 Series has gained a reputation by providing users with advanced configuration, easy connectivity and multimedia flexibility, portable package which demonstrates the thoughtfulness of giving the mobile user what they desire to meet their unique and changing needs.

The 6100 Series continues this thoughtfulness by including an enhanced pointing device with 2 click buttons. It is also equipped with a removable Li-Ion or NiMH battery pack that by utilising the user programmable power management utility, built-in to the BIOS, can efficiently save power consumption. It also comes in a handy 2.4Kgs package which combined with its size makes a convenient travelling companion. Its on-board memory capacity of 64MB SDRAM, upgradable to 128MB SDRAM, offer the user alternate and competitive choices for their different needs. It can also be equipped with either a 33.6Kbps or a 56Kbps fax modem to give the user quicker and easier access to the network.

The 6100 Series manageability and full desktop expandability; with 512KB L2 Cache, various I/O ports (serial, parallel, keyboard/mouse, VGA and audio) and Modular Device bays, provide the user with multiple I/O interfaces. The Modular Device Bays (removable HDD, battery and media bay) provide the user with the maximum of configuration flexibility.

The 6100 Series boasts a 3-mode floppy disk drive, a 24X CD-ROM, 3D/Direct Draw, a PCI-based 128-bit graphics accelerator and a 1.5 MB embedded video DRAM that can support an external CRT video display up to 1024 x 768 pixels with 256 colours

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Big Hard Drives



We look at drives in the 6 to 11GB range—the current sweet spot for internal hard drives—to find out which gives you the best performance for your dollar.

By Steven Turvey

If your idea of personal PC space is the luxury of downloading half a dozen shareware utilities, a slew of photos or perhaps a few bootleg audio recordings without having to resort to emptying the Recycle Bin by the end of the night, we've got good news. Even the most modest of the drives reviewed here offers plenty of storage space for you to fill.

The arrival of Windows 98 also makes it a great time to invest in a monster-size drive, in part because Win 98 makes the FAT32 file system readily available. Unlike the FAT (also called FAT16) file system used by Windows 3.x and most variants of Windows 95, FAT32 supports partition sizes larger than 2GB. In other words, with Windows 98 you'll be able to access your new drive as one big volume rather than having to split it up into a few, although you may have to overcome a BIOS limitation to do so. FAT32 first became available with

OEM Service Release 2.0 of Windows 95, but OSR 2.0 was available only with new systems.

But perhaps the best reason for upgrading to one of these huge, fast, state-of-the-art drives is the price. Prices start from a tiny \$48 per gigabyte (GB) with the Samsung offering—so you will require mercifully little in the way of cash outlay for a great capacity and performance boost.

Fujitsu

MAB3091SC & MAC3091SC

Fujitsu supplied two Ultra SCSI 2 hard drives that appear essentially identical with the exception of the spindle speed. The MAB drive has a spindle speed of 7200RPM, certainly no slouch, however the new MAC drive has a spindle speed of 10,033RPM which brings it into direct competition with the Seagate Cheetah. Although

it has no discernible performance impact, it's interesting to note that the Fujitsu's spindle rotates 8RPM faster than the Cheetah.

The drives have a capacity of 9.1GB and both were supplied with a single 80-pin high-density SCA connector and no separate power connector or SCSI ID jumpers. This necessitated the addition of a small adaptor board for our 68-pin cable. The adaptor board had a single 68-pin connector, 4-pin power connector and SCSI ID jumpers on one side with a single 80-pin connector on the reverse side. The drives are also available in the more standard configuration but only the SC variant was available at the time of testing. Each drive boasts a 496KB buffer, roughly half that of the Cheetah, but they are both rated at the same 1 million hours MTBF.

The Winstone 98 results show that most of the drives differ very little in the day-to-day operations of the average Windows

HARDWARE

Hard Drives



user as the hard drive is only a small component of the overall test suite.

The MAC drive was certainly faster than the MAB, not quite the 40 percent indicated by the spindle speed differences but still a healthy 25 percent faster in WinBench. The difference between the MAC drive's performance and that of the Cheetah in WinBench was so small as to be insignificant (the Cheetah was up to a couple of percentage points faster).

Both drives were slightly noisier than average with the MAC drive slightly louder than the MAB drive.

The cost per GB, as one would expect with Ultra SCSI's high spindle speed drives, is quite high, \$166 and \$199 per GB for the MAB and MAC drives, respectively. This does however give the MAC drive a slight price per GB advantage over its com-



petition, the Cheetah.

MAB3091SC. Price: \$1517; **MAC3091SC.** Price: \$1812; Fujitsu Australia; Ph: 02 9776 4555, Fax: 02 9776 4556; www.fujitsu.com

Maxtor

Diamond Max 3400 & Diamond Max Plus 2500

Both Maxtor drives are ATA-4 EIDE, however while the larger of the two drives, the 13GB Diamond Max 3400, has a more conservative/typical spindle speed of 5400 RPM the 9GB Plus 2500 zips along at 7200 RPM—the current peak for IDE drives. Both have four platters but the

3400 with the slower spindle speed manages to cram an extra 4GB over the 2500. While the 3400 makes do with 256KB of cache, the 2500 is turbo charged with twice as much cache—512KB. Unlike the large SCSI drives, which are expected to be tortured in a server, IDE drives have a lower MTBF of 500,000 hours and all things being equal, given the continuous power on status of servers, probably equates to a longer life.

The drives have identical form factors and at the rear, have a standard IDE connector master slave jumper block and power connector. As with the vast majority of drives nowadays the master/slave jumper settings are printed on the drive label. Both drives were quiet although the 2500 was a good deal noisier than the 3400 drive.

In Winstone 98 the 2500 was, as expected, faster than the 3400, but only marginally, and as previously mentioned, there was very little to distinguish the drives in this test. We were quite astonished with the re-



sults of the WinBench 98 synthetic disk performance tests. In the business disk test, as one would expect, the 2500 was faster than the 3400 by about eight percent. Unexpectedly however the "slower" 3400 was actually four percent faster than the 2500 in one test. We retested both drives several times and performed additional defrags on the drives but still the 3400 was around four percent faster than the 2500. All of the drives tested were formatted FAT32 with 8KB clusters. We could not source another drive in time to test for this comparison but will investigate the anomaly further when we do indeed receive another 2500 drive.

Both drives were performance leaders amongst the IDE drives tested, soundly outperforming the Seagate and Samsung IDE drives (it should be noted however that the Seagate Medalist drive, although it appeared healthy during testing, failed soon after testing was completed). All of the SCSI drives outperformed the IDE drives in the

Winbench tests, however the Maxtor drives were only around five to 10 percent behind the Quantum SCSI drive.

At just \$66 per GB the 3400 represents excellent value for money with the 13GB



drive setting the buyer back just \$899 (although we imagine street prices of all the drives tested will be significantly lower). The 2500 drive will set you back \$830 and so basically represents a loss of around 4GB for the same price point and breaks down to a reasonable \$83 per GB.

Diamond Max 3400. Price: \$899; **Diamond Max Plus 2500.** Price: \$830; Maxtor Australia; Ph: 02 9369 3662, Fax: 02 9369 2082; www.maxtor.com

Quantum

Viking II (aka Phoenix)

We received an evaluation unit that was labelled Quantum Phoenix, however, a second more permanent label hidden behind the eval label proclaimed the drive a Viking II. The more permanent label also had a full representation of the 12 jumpers located on the drive's controller board and their respective functions. The 9.1GB drive has an Ultra SCSI 2 interface with a 68-pin high-density connector, however it appears a SCA version of the drive, similar to the Fujitsu MAB drive, is also available.

The drive has a respectable 512KB buffer and, what has become the standard spindle speed for large SCSI drives, 7200RPM. MTBF claims are at best manufacturers' estimates and perhaps Quantum are a tad more conservative in their estimating department, but the MTBF of 500,000 is half that of the Fujitsu and Seagate SCSI drives tested.

The Quantum was overall the slowest of the SCSI drives tested, admittedly Winstone is not a good test for these drives but the Quantum was slower in Winstone than the

SUMMARY OF FEATURES

Hard Drives



Product	Fujitsu MAB 3091SC	Fujitsu MAC 3091SC	Maxtor Diamond Max 3400	Maxtor Diamond Max Plus 2500	Quantum Viking II	Samsung SV0644A
Price	\$1517.00	\$1,812.00	\$899.00	\$830.00	\$1028.46	\$309.00
Cost per GB	\$166.70	\$199.12	\$66.10	\$83.00	\$113.02	\$48.28
Distributor	Fujitsu Australia	Fujitsu Australia	Maxtor Australia	Maxtor Australia	Quantum Australia	Westan
Address	2 Julius Ave North Ryde 2113	2 Julius Ave North Ryde 2113	55 Grafton Street Bondi Junction 2022	55 Grafton Street Bondi Junction 2022	Lev. 4, 6-10 O'Connell St Sydney 2000	1042 Dandenong Road Carnegie 3163
Phone	02 9776 4555	02 9776 4555	02 9369 3662	02 9369 3662	02 9232 1999	03 9563 6775
Fax	02 9776 4556	02 9776 4556	02 9369 2082	02 9369 2082	02 9232 1889	03 9563 6836
Web address	www.fujitsu.com	www.fujitsu.com	www.maxtor.com	www.maxtor.com	www.quantum.com	www.westan.com.au
Warranty	5 years	5 years	3 years	3 years	5 years	3 years
Capacity (GB)	9.1	9.1	13.6	10	9.1	6.4
Platters, heads	5, 10	5, 10	4, 8	4, 8	5, 10	2, 4
Interface	UltraSCSI 2	UltraSCSI 2	ATA-4	ATA-4	UltraSCSI 2	ATA-4
Spindle speed (RPM)	7200	10,033	5400	7200	7200	5400
Buffer size	496KB	496KB	256KB	512KB	512KB	512KB
MTBF (hours)	1,000,000	1,000,000	500,000	500,000	500,000	500,000
Height (cm)	2.54	2.54	2.59	2.59	2.54	2.5



Quantum Viking II

two Maxtor IDE drives, admittedly only by an insignificant 0.1 to 0.3 points. In the Business Winmark test the Quantum was equal slowest with the Fujitsu MAB drive and in the High-End test was a paltry four percent behind the Fujitsu MAB which we consider to be the closest competitor on specifications alone.

The Quantum was slightly noisier than average but not annoyingly so and we must also consider that this is a preproduction eval unit and that noise level and, most importantly, performance, may be improved on the production unit.

Viking II. Price: \$1028.46; Quantum Australia; Ph: 02 9232 1999, Fax: 02 9232 1889; www.quantum.com

Samsung

Samsung SV0644A

Perhaps not a name that is synonymous with hard drives, Samsung nevertheless are a company with many strings to their bow, from producing semiconductors,

home appliances and automobiles. One of Samsung's claims to fame was that they were apparently the first to produce 3.2GB hard drive platters at a time when Seagate and Quantum were just shipping 2.5GB and 2.8Gb platters. As a consequence, the 6.4GB Samsung drive has just two platters and four heads and one would expect the fewer moving parts to result in cost savings during manufacture.

At the rear of the drive there is an industry standard IDE connector, power connector and a jumper block with the settings clearly laid out in a table on the drive's label. MTBF is slightly lower than that quoted by the other more well-known drive manufacturers but at 400,000 is still pretty good—and again, it could be just a case of Samsung being overly conservative with the figure (to put a figure of 400,000 into perspective, it is equal to running the drive 24 hours a day continuously for around 46 years).

The drive has an industry standard spindle speed of 5400RPM, on par with the Seagate

Medalist and the Maxtor 3400. However the Samsung has 512KB buffer compared the 3400's 256KB and Medalist's 128KB buffers, so all being equal, one would expect the Samsung to have the performance edge.

This was not the case however, the Samsung was the slowest of the drives tested. It was eight percent and 20 percent slower in Business and High-end Disk Winmark respectively compared to its nearest competitor, the Seagate Medalist. Bear in mind that for day to day Windows applications this only amounts to around a four percent Winstone difference between the two drives—probably not noticeable to the average user.

Where the Samsung does shine however is purchase price, with an RRP of \$309 the Samsung only costs \$48 per GB, substantially less than its nearest competitor at \$61 per GB.

SV0644A. Price: \$309; Westan; Ph: 03 9563 6775, Fax: 03 9563 6836; www.westan.com.au

Seagate

Medalist 10240 and Cheetah 9LP

The two Seagate drives tested represent opposite ends of Seagate's product range, the Medalist is the low-cost IDE alternative for your average PC while the Ultra SCSI 2 Cheetah is the fastest drive in their stable and is perfectly suited for high end users and file servers.



Samsung SV0644A

HARDWARE

Hard Drives

over the controller circuitry. The Cheetah also has industry standard connectors but in this case a high-density 68-pin SCSI connector rather than EIDE. The Cheetah has three sets of jumper blocks with detailed configuration diagrams present on the drive label.

The two drives' buffer sizes vary dramatically, the high performance Cheetah has a very large 1MB buffer while the Medalist has a more conservative 128KB buffer—the smallest of any drive in this comparison. MTBF's vary quite dramatically as well. As one would expect, the Cheetah, given its file server aspirations, should have a higher MTBF, and it does—1,000,000 hours compared to the Medalist's fairly standard 500,000 hours.



Seagate Medalist 10240

Of the two drives, the Medalist was definitely the quietest, the Cheetah would have to rank as one of the noisiest drives we have tested, but tucked away in a large file server, you would hardly notice it.

The Medalist's performance was good for its class, it was certainly not as fast as



Seagate Cheetah 9LP

either of the Maxtor EIDE drives, which were significantly faster in Winbench and were over a point faster in Winstone as well. It does however boast a lower cost per GB than both Maxtors. At only \$623 the Medalist is \$61 per GB. The cost per GB is low but the Samsung is considerably lower.

The Cheetah is quite simply the fastest drive we tested in both Business and High-End WinBench, but it should be noted that the Fujitsu MAC drive was literally breathing down its neck. Running day to day Windows applications the Fujitsu MAC drive managed to overtake the Cheetah and was barely 0.4 points faster in Winstone.

The Cheetah was also the most expensive drive tested at \$1950 it is \$212 per GB compared to the Fujitsu MAC that manages to stay below the magic \$200 per GB mark at \$199 per GB.

Medalist 10240. Price: \$623; **Cheetah 9LP.** Price: \$1950; Achieva; Ph: 02 9742 3288, Fax: 02 9742 3188; www.seagate.com ■

Seagate Medalist 10240	Seagate Cheetah 9LP (ST39102LW)
\$623.00	\$1950.00
\$61.08	\$212.65
Achieva	Achieva
02 9742 3288	02 9742 3288
02 9742 3188	02 9742 3188
www.epson.com.au	www.bbf.com.au
12 months	12 months
10.2	9.17
4, 8	6, 12
ATA-4	UltraSCSI 2
5400	10025
128KB	1MB
400,000	1,000,000
2.5	2.5

The Medalist has a standard spindle speed of 5400RPM while the Cheetah almost doubles the spindle speed to 10,025RPM, only the new Fujitsu MAC drive has a faster spindle (only 8RPM faster).

The Medalist is a 10.2GB drive while the Cheetah tops out at 9.17GB. The Medalist features industry standard EIDE, power connectors and a set of jumpers at the rear, but sadly no mention of the jumpers or their function is made on the drive's case or label. The Medalist was the only drive that has a metal RF shield

Editors' Choice

- SCSI: Fujitsu MAC3091SC
- EIDE: Diamond Max 3400



There are two clear categories amongst the test drives, the high performance SCSI category and

the low cost EIDE drives—we tested four drives in each category.

The battle for top spot in the SCSI arena was between the Seagate Cheetah 9LP and the Fujitsu MAC3091SC. In testing, we found there was so little difference between the specifications and performance of both of these drives that the cost per GB became the deciding factor. As a consequence the Editors'

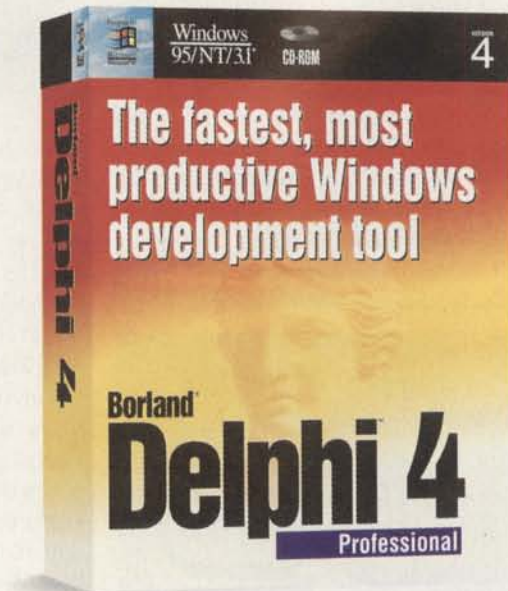
Choice is awarded to the Fujitsu MAC3091SC.

Worthy of note for its low price alone was the Quantum Viking II. Although its performance was not stunning, its price certainly was. At just \$1028 it represents great value for money if absolute performance is not an issue.

If performance *is* an issue in the EIDE arena then the answer is quite simple, buy a Maxtor. Our favourite of the two tested, given its low price, large capacity and great performance, is the Diamond Max 3400, certainly worthy of a Merit Award.

However, for sheer value per GB you cannot beat the Samsung. Its performance will not set the world on fire but at \$309 for 6.4GB it certainly is a bargain buy.

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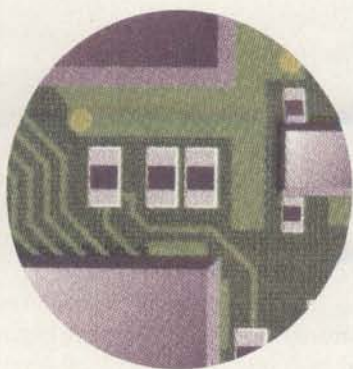
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Graphics Cards



**Confused about all the new graphics cards hitting the market?
Read on to find out what's hot.**

By Steven Turvey

In very close succession, three graphics processor manufacturers have released some significant processors, so the Lab decided to do a quick round-up. We managed to source two Nvidia Riva TNT based cards—the Diamond Viper 550 and the Creative Graphics Blaster Riva TNT. The Hercules Terminator Beast uses the S3 Savage chip (there is a faster version of this card based on SGRAM but we *could only source the slower SDRAM based card for this test*). Arriving very late and barely making it into the test cycle was the 3DFX Banshee chip also sourced from Diamond—the Diamond Fusion.

We were also provided with Hercules' interpretation of the Voodoo 2 chipset, a Stingray/2 so we plugged this into the test bed to give it a run. The test bed was an Iwill BD100 motherboard, Pentium II 333, 64MB of SDRAM, Maxtor 91000D8 hard

drive and a 24-spin CD-ROM drive. As a yardsticks we re-tested two graphics cards from the previous Lab test featured in the August Product Comparison; the Matrox G200 and the Diamond Monster 2. All the cards tested were AGP-compliant with the exception of the Voodoo 2 based products, which were PCI.

Where relevant we ran WinBench 98 2D graphics WinMark tests on the cards (as the Voodoo 2 products are 3D only they were naturally not present in these test results). To measure 3D performance, in addition to 3D WinBench we ran Quake 2, Turok and Forsaken to get an idea of games performance.

Several of the cards were tested with Beta or early production drivers so we expect an improvement in many of the cards' 3D performance over the next few months. In addition, as many of the driver sets were not mature they were lacking in refinement and features we would expect

to see on the retail versions.

Diamond Multimedia

Diamond Monster Fusion

Graphics Processor: 3DFX Banshee

This card was a very late entrant in this little comparison, so we did not have time to iron out all the problems we were experiencing with the pre-production drivers. Nevertheless we were able to run a couple of the tests and get a feel for the card's performance. (We had received an even earlier pre-production version of the card that ran extremely hot. The second card we received had a cooling fan on the chip and this certainly worked a treat.)

The Banshee from 3DFX is their first combination 2D/3D single chip implementation; the earlier Voodoo Rush utilised a separate 2D processor. The Banshee has a 128-bit memory interface and our test

SUMMARY OF FEATURES

Graphics Cards



	Creative Graphics Blaster RivaTNT	Diamond Monster Fusion	Diamond Monster 2	Diamond Viper 550	Hercules Beast	Hercules Stingray 2
Distributor	Creative Pacific	Chips and Bits	Chips and Bits	Chips and Bits	Peripheral Sources International	Peripheral Sources International
Telephone	02 9906 8887	03 9696 1911	03 9696 1911	03 9696 1911	03 9878 8611	03 9878 8611
Fax	02 9906 5577	03 9696 1942	03 9696 1942	03 9696 1942	03 9878 8090	03 9878 8090
Web address	www.cppl.com.au	www.diamondmm.com	www.diamondmm.com	www.diamondmm.com	www.psiaust.com	www.psiaust.com
Processor	Riva TNT	Banshee	Voodoo 2	Riva TNT	S3 Savage	Voodoo 2
RRP	\$499	\$399	\$449	\$459	\$269	\$449
Memory (standard and maximum)	16MB	16MB only	8MB (12MB version available)	16MB only	8MB SDRAM	12MB
Memory type	SDRAM	SGRAM	EDO	SDRAM	SDRAM	EDO
Bus	AGP	AGP or PCI	PCI	AGP or PCI	AGPx2	PCI
Maximum 2D resolution, colour depth and refresh rate	1920 x 1200 @ 24bit x 60Hz	1920 x 1440 @ 24bpp x 60Hz	3D only	1920 x 1200 @ 24bpp x 85Hz	1600 x 1024 @ 16bit x 85Hz	3D only
Maximum 3D resolution, colour depth and refresh rate.	1600 x 1200 x 24bit x 75Hz	1280 x 1024 @ 24bpp x 70Hz	800 x 600 @ 16bpp x 75Hz	1600 x 1200 @ 24bpp x 85 Hz	1600 x 1200 @ 16bit x 85Hz	800 x 600 @ 16bit x 120Hz SLI: 1024 x 768 x 16bit x 85Hz
Full OpenGL or subset support	Full	Full	Subset	Full	Full	Subset
Glide support	■	■	■	■	■	■
Direct 3D support	■	■	■	■	■	■
Warranty	3 year	3 year	3 year	3 year	5 year	5 year

board included 16MB of SDRAM. 3DFX have managed to cram the pixel processing unit, texture processing unit and 2D functions into the one die—Voodoo 2 cards have separate chips for the pixel and texture processors. In the process, the Banshee is one texture unit down on the Voodoo 2 boards which have dual texture processors. What difference will this make? It will result in a performance hit when multiple textures are mapped over objects as, naturally, two units can process the information faster than the single Banshee unit. So you'll see a difference with games such as Quake 2 that utilise multiple textures; the Diamond Monster 2 is significantly faster. However, the Banshee can be clocked

higher than the Voodoo 2 chipset and we would therefore expect higher performance in games that did not employ multiple textures.

Only two tests were not completed on the card owing to Beta driver problems and the lateness of its delivery: 3D WinBench and the 800 x 600 24-bit 2D graphics performance test.

However, the tests we did run indicate very impressive performance indeed. As previously mentioned, the Monster 2 outperformed the Diamond Monster Fusion in Quake 2, in fact the Monster 2 was easily the fastest card in this test. At 640 x 480 the Fusion was the second fastest card tested, even outgunning the Hercules Stingray 2,

something the Voodoo 2 cards could not do unless two are linked in SLI mode. At 1024 x 768 the Fusion was faster than any of the other cards tested at this resolution.

In Turok and Forsaken the Fusion outperformed both Voodoo 2 cards, a byproduct of its faster clock speed, however it lagged behind the TNT based cards in Forsaken but showed a clean set of heels to all comers in Turok. In a word, 2D performance was superb. At 1024 x 768 the Fusion was a good deal faster than all the other 2D capable cards by a significant margin.

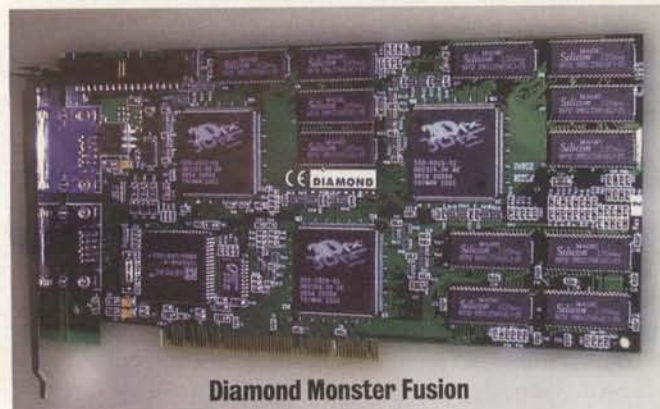
We cannot wait to test the production version of this card, it should be the fastest 2D/3D card currently available.

Diamond Monster Fusion. Price: \$399; Chips and Bits; Ph: 03 9696 1911, Fax: 03 9696 1942; www.diamondmm.com

Creative Labs and Diamond Multimedia
Creative Graphics Blaster Riva TNT & Diamond Viper 550

Graphics Processor: Riva TNT

Riva was initially not going to release the successor to the Riva 128 until 1999 but industry scuttlebutt has it



Diamond Monster Fusion

HARDWARE

Graphics Cards

Matrox G200

Focal Point Computing

03 9525 1144

03 9525 192

G200

\$356

8MB (std) 16MB(max)

SGRAM

AGP (full 2x)

1800 x 1440 @
16.8 million colours, 65Hz

1280 x 1024, 16.8 million
colours 100Hz 1920 x 1200,
65 thousand colours, 80Hz

OpenGL ICD (to be
released soon)

■

3 year

Mystique G200

Focal Point Computing

03 9525 1144

03 9525 1925

MGA-G200

\$356

8MB (std) 16MB(max)

SDRAM

AGP (full 2x)

1800 x 1440 @ 16.8 million
colours, 65Hz

1280 x 1024, 16.8 million
colours 100Hz 1920x1200, 65
thousand colours, 75Hz

OpenGL ICD (to be
released soon)

■

3 year

crank the card up to 120MHz (where performance became pretty flaky). However Riva is still quoting 9GFLOPs floating point and 36 billion operations per second peak—anybody for a Cray on a graphics card?

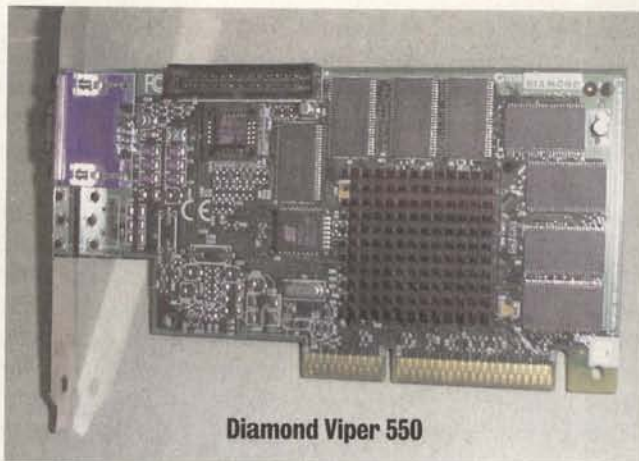
Apparently the name TNT comes from an abbreviation of Twin Texel units to indicate that the chip boasts the dual texture processing units of the Voodoo 2 cards, but in a single chip. Also crammed into the large graphics processor is a fast 2D-processing unit.

Overall performance of both vendors' cards was excellent, but the edge in performance would have to go to the Diamond Viper 550, which consistently outperformed the Creative RivaTNT, generally by a small margin.

The Diamond and Creative were first and second placegetters respectively in Forsaken and placed second and third respectively in Turok behind the Fusion card. Even though both cards were soundly outperformed by all the 3DFX based graphics cards in Quake 2 they were certainly no slouches, ranging from 50fps at 640 x 480 down to 24.4fps at 1024 x 768, with the Creative card taking the greater performance hit

as the display resolution increased. In 3D WinBench both cards were clearly superior to all the other cards tested with the Diamond scoring an unprecedented 1300 and the Creative an equally impressive 1200. In the 2D WinMark tests, again the Diamond displayed a slight edge over the Creative.

There is no doubt the two cards are very impressive performers in both 2D and 3D and at \$399 for the Creative and \$449 for the Diamond they represent good value for money. However, only the Creative card shipped in a full retail pack complete with two games, Incoming and Forsaken and a neat gamma correction utility to customise the light levels of games such as Unreal and



Diamond Viper 550

Quake 2. The Diamond retail pack will consist of the full version of Motorhead Grem-lin Interactive, Fremont SE 3D data animation software by Portola Dimensional Systems, a software DVD player, PhotoSuite SE by MGI, VRCreator/Learning Edition by WIRL and several other small utilities. It really is a close call with these two cards, the Diamond is slightly faster and has a large swag of software but then the Creative is less expensive and bundles two very good games.

Creative Graphics Blaster Riva TNT. Price: \$399; Creative Pacific; Ph: 02 9906 8887, Fax: 02 9906 5577; www.cppl.com.au.

Diamond Multimedia Viper 550. Price: \$499; Chips and Bits; Ph: 03 9696 1911, Fax: 03 9696 1942; www.diamondmm.com

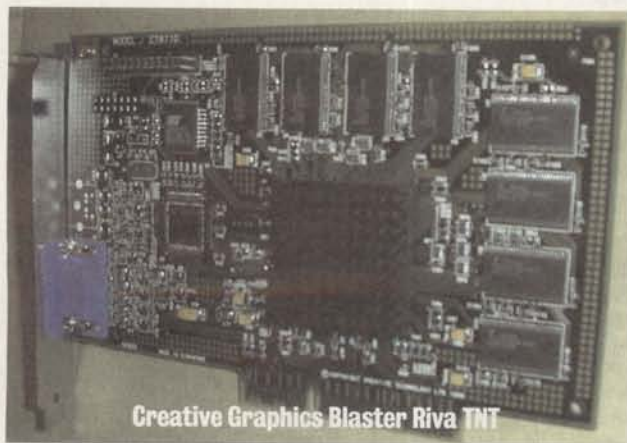
Peripheral Sources International

Hercules Beast

Graphics Processor: S3 Savage 3D

After its initial splash onto the market with its low cost Virge 2D/3D accelerator chips, S3 has been reasonably low key. The Virge chips had impressive 2D performance but tended to be a little lacklustre in the 3D stakes. The new Savage 3D chip claims 128-bit dual rendering pipelines, up to six times texture compression for improved bandwidth over the AGP bus and Voodoo 2 performance in 3D. As for the latter claim, more on that later.

The Savage 3D appears to be another accelerator that had to be "detuned" to lower operating temperatures and increase stability. There are reports that the original processor ran at 125MHz but major graphics card vendors are likely to release production versions at 110MHz. Our sample was a pre-production board but it had al-



Creative Graphics Blaster Riva TNT

that they were under a great deal of pressure from graphics card vendors to bring the chip out earlier. The initial performance figures for the TNT chip were astonishing, but relied on the 7-million-transistor chip running at around 125MHz and the chip became extremely hot at this clock rate. So until they manage to produce the chip in 0.25-micron technology the TNT is "detuned" to around 110MHz with a corresponding drop in performance. As most of the drivers supplied for this review were pre-production we were not going to comment on their functionality but it should be noted that the drivers include an over-clocking setting that allows the user to

HARDWARE

Graphics Cards

ready been detuned when we received it. There are actually two versions of the Hercules Beast; ours was the slower SDRAM version, we hope to test the faster SGRAM board in the near future.

If you stick to just the WinBench 3D scores alone, then a score of 977 to the Monster 2's 1000 is certainly Voodoo 2 territory. But then when compared with the Monster 2's outrageous 75fps in Quake 2 at 640 x 480 the Beast's 49.5 looks more like a pussycat. This is however, very unfair to the Beast, as these frame rates are very close to the much more expensive TNT competitors which also polled around the 50fps mark. Quite simply, in Quake 2 the Diamond Monster 2 is currently the undisputed champion.

With the exception of the Matrox G200, the Beast was the slowest of the cards in the Turok and Forsaken tests, but it was not that far off the pace—it still achieved very respectable scores of 85fps and 125fps in Turok and Forsaken, respectively.

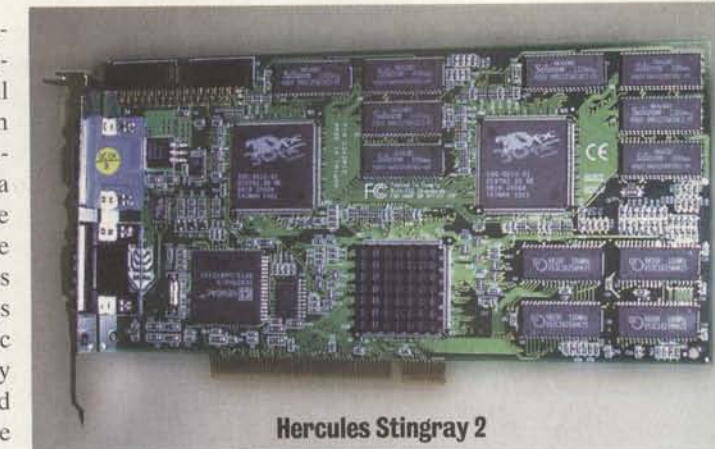
Of the 2D capable cards the Beast was again the slowest card tested, but as far as

2D apps are concerned you wouldn't be able to tell the difference in day-to-day operation. We are at a point where the 2D performance of most graphics cards becomes purely academic and we see very little real world benefit from the high figures reported in WinBench.

At a low \$269 the Beast certainly represents a great deal of 3D graphics power for little dollars and it's quite a stretch to the \$400 to \$500 the competition is asking.

Hercules Beast. Price: \$269; Peripheral Sources International; Ph: 03 9878 8611, Fax: 03 9878 8090; www.psiaust.com

Peripheral Sources International



Hercules Stingray 2

simply, the Diamond Monster 2 looks the same as the Creative Voodoo 2 which looks the same as the Hercules Stingray 2. They are all based on the same 3DFX reference board.

The Stingray proves there is a lot to be said for a card's drivers; it was, in some cases, soundly outperformed by the almost identical Diamond Monster 2. In Quake II the Monster 2 managed an awesome 75fps compared to the Stingray's nevertheless impressive but much lower 61fps. In Turok and Forsaken, the difference was not as pronounced but the Monster 2 still had the edge and the Banshee and TNT cards were more than a match. In WinBench 3D the Stingray 2 scored 1010, 10 points higher than the Monster 2.

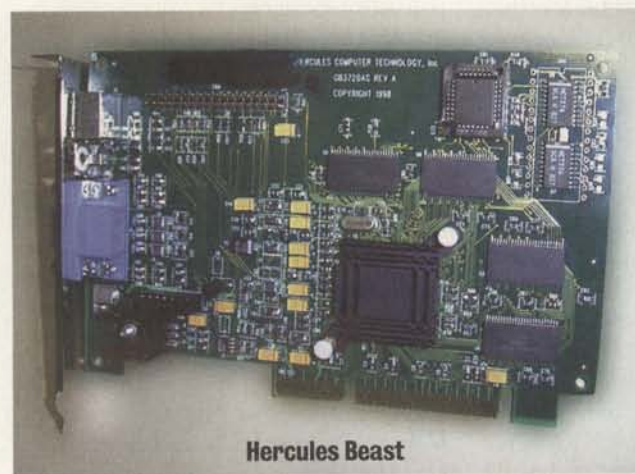
The 12MB Stingray 2 has an RRP equal to the 8MB Monster 2 and if Hercules can do some serious tweaking to the cards Quake 2 performance for their production card then it will represent great value for money.

Hercules Stingray 2. Price: \$449; Peripheral Sources International; Ph: 03 9878 8611, Fax: 03 9878 8090; www.psiaust.com ■

Hercules Stingray 2

Graphics Processor: 3DFX Voodoo 2

Although it doesn't sport a new graphics processor, the Stingray 2 is nevertheless a new offering from Hercules and certainly deserves a mention. By now, the Voodoo 2 based boards descriptions and photos have been done to death—to put it quite



Hercules Beast

Editors' Choice

● Diamond Monster Fusion



It seems a little inappropriate selecting an Editors' Choice from a group of, in the most part,

preproduction cards. However, for 3D only upgrade the Diamond Monster 2 is an easy winner. In the 2D/3D arena it is much more difficult, the TNT and Banshee cards are all excellent, but we reckon the Diamond Monster Fusion with its

Banshee processor and a stable set of drivers will have the price performance edge over the more expensive TNT cards. The only concern we have with the Banshee (and the same is true of the Voodoo 2) is the lack of or poor AGP support. And, given that the next generation of Quake-like games will have at least twice the amount of textures as Quake 2 we could see the 3DFX chips starting to choke well before the other AGP compliant offerings.

If money is an issue, and it almost always is, then your choice is a no brainer, the Hercules Beast represents excellent value for money at almost half the price of some of the competition.



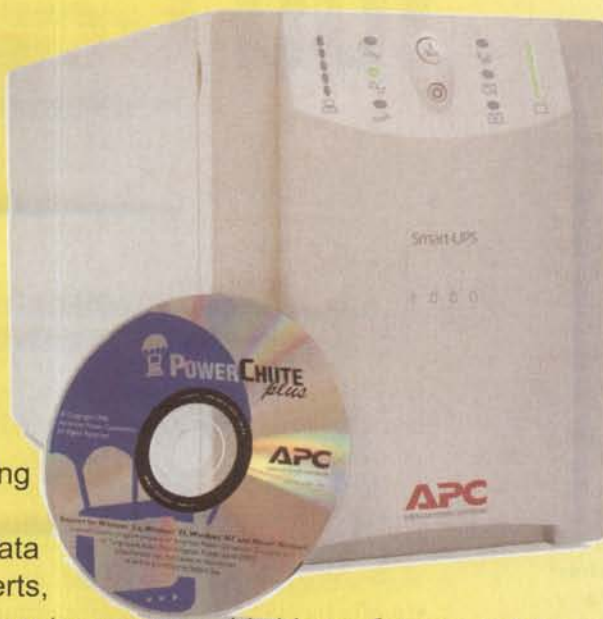
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You Can Get



1 CORPORATE HELP DESK

Remote-control software lets help-desk administrators troubleshoot problems without having to run all over the building. Help-desk administrators look for strong remote-control performance—plus features such as tools for pushing the host software down to client PCs for easy installation, and the ability to launch the host module remotely.

THE FOUR ROLES OF REMOTE-CONTROL SOFTWARE

2 SYSTEM ADMINISTRATOR

By using remote-control software, system administrators no longer need to be chained to their desks. A system administrator can monitor servers and correct problems at any time of the day from any location. One of the key features is the ability to monitor multiple hosts.



e

ver wish you could be in two places at once? Remote-control software can't solve that problem, but it can help you to be in two PCs at once. Using a remote-control program, you can access a PC remotely to exchange files between systems, run applications, take over a client PC or server to troubleshoot a problem, and much more.

Remote-control software is an application that you install on two PCs that permits one system (the guest) to connect with and control another (the host). Once you're connected, you can do just about anything as if you were sitting at the host PC. In addition, remote-control software lets you transfer files between PCs faster and more efficiently.

The latest remote-control programs support a myriad of connection types including Internet connections, which are becoming increasingly important. The key advantage to Internet connections is that they let mobile users connect to a PC or server anywhere on the globe via an inexpensive local telephone call. So no matter where you are, you can always stay in touch.

Most users associate remote-control software with telecommuting or day extending. Telecommuters typically use remote-control software to connect to an office PC over an analogue phone line to exchange files and access productivity applications.

But there are many other uses for remote-control technology. For example, in a corporate setting, a help desk administrator can take over a client PC and show a worker how to accomplish a task or fix a problem. Network administrators use remote-control software to connect with a Windows NT server and troubleshoot a problem without making the long

Review Criteria The products in our main story provide remote-control and file-transfer features. They can be used in a range of applications including telecommuting, help desks, system administration and customer support. To qualify for a review, each product must also: • provide 32-bit guest and host clients • operate under Windows 95 and Windows NT, at a minimum • support modem-to-modem connections. Each of the products also supports other types of connections including network, Internet and dial-up networking.

There

trek to the server room. And many major computer vendors put remote-control software on their PCs so that they can provide customer support remotely. Our testing was designed to take all of these applications into account.

In general, these products were

easy to install and configure, especially for network administrators. Most programs install the host and guest software in a single step; a few require you to install them separately. After installation, the program recognises your modem (if you're using one), and most provide wizards that walk you through the process of configuring connections and adding new users.

All of the programs in this roundup let you resize the host screen to fit the guest's screen and disable the wallpaper and screen saver on the host PC. Another trick used to increase performance is to reduce the number of colours in a bitmap. *More innovative features* include voice chat over data and the ability to connect a single guest PC to multiple hosts—for monitoring multiple servers at once, for example.

One of the most common uses of remote-control programs is to transfer files to and from a remote PC and to keep files and folders on multiple PCs in sync. Delta file transfer, which copies only changed portions of files, and compression speed up file transfers.

But be aware that not all products deliver true delta file transfers: CrossTec's NetOp uses a modified delta file transfer that provided no real performance boost on our tests; Stac's ReachOut Enterprise 8.0 failed to execute delta file transfers properly because of a bug in the program. In addition to scripting, most programs provide wizards for creating file-transfer routines that can be invoked on a schedule.

To gauge the software's performance on both remote-control and file transfers, we conducted a series of tests under both Windows 95-to-Windows 95 and Windows NT-to-Windows NT. Our tests covered three different types of connections: modem-to-modem, dial-up networking and network. The better programs performed consistently

from Here

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Procomm RapidRemote 1.51	123	Summary of Features	128

TELECOMMUTER

Connecting over the Internet or dialling in to a company network, a telecommuter can take over a host system (usually, a desktop PC), as though sitting at a desk. Key features for these users include easy modem configuration, fast file transfers, wizards for scheduling unattended synchronisation routines and printer redirection.

CUSTOMER SERVICE

Many PC vendors such as Compaq and IBM bundle remote-control software with their products. If a customer encounters a problem, a support technician can take over the system and resolve the problem without having to ship the PC back and forth. Key features for these users include voice chat over data.

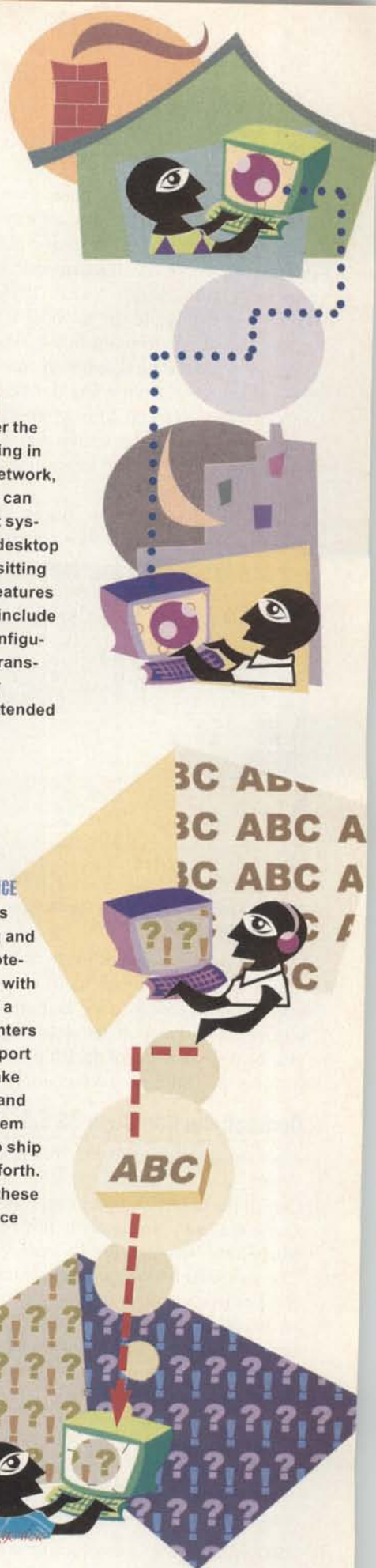


ILLUSTRATION BY HYE.K

Remote-Control Software

well on both platforms and under all connection types.

For many corporations seeking to implement remote-control solutions, security is a major concern—especially when using Internet connections. Standard security features include the ability to “blank” the host screen and to disable the keyboard and mouse, as well as to force the host to reboot if disconnected during a session in order to prevent someone from using the system without having to log on. Most of these programs also support user names and passwords, data encryption and integration with Windows NT security.

With all the different chores these products are called on to perform, we did

Symantec's pcAnywhere 3.2 8.0.

In addition to Windows 95 and Windows NT, Carbon Copy supports Windows 3.x and Windows CE. It includes a parallel cable and a microphone and supports modem, network (IPX/SPX and TCP/IP), Internet, parallel and serial, infrared and ISDN connections.

Of the products in this roundup, Carbon Copy delivered one of the best out-of-box experiences. The program walked us through the setup and configuration. Carbon Copy's Create New Connection wizard looks and acts like the one in Windows. System administrators will appreciate the Create New User wizard.

A new AutoPilot wizard lets you automate file transfer and synchronisation tasks. AutoPilot routines can be run manually or scheduled on a regular basis using Carbon Copy's built-in scheduler or Windows' System Agent.

Carbon Copy now supports voice-over-data communication so that users can chat during remote-control and file-transfer operations. Unlike that of many programs, Carbon Copy's chat feature doesn't require an ASVD/DSVD (analogue or digital simultaneous voice and

rights to groups and individuals. For secure data transmission, Carbon Copy supports encryption with key lengths up to 64-bits.

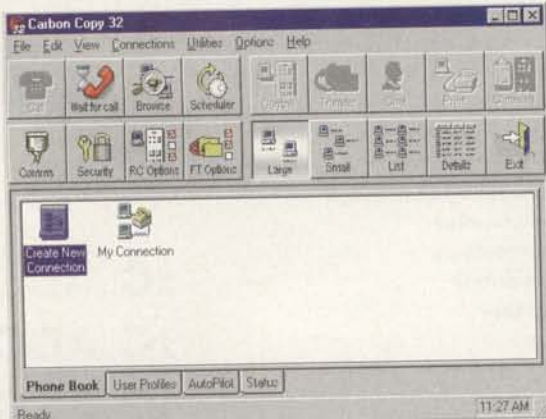
Although a couple of programs reviewed here retain a slight edge, Carbon Copy has a long list of features and powerful wizards that put it near the top of this category. —Padraic Boyle

CoSession Remote 32 8.1

\$129. Marketing Results: 02 9899 5888; www.artisoft.com

With a powerful suite of remote-control features, Artisoft's CoSession Remote 32 8.1 should appeal to a broad range of users. But it has some shortcomings, such as problems with dial-up networking, an inability to redirect printers, and the lack of a scripting utility to automate tasks. These glitches make CoSession better suited as a help desk application than as a dial-in remote-control client.

CoSession includes the guest and host software for both Windows 95 and Windows NT on a single CD. It can operate over dial-up, modem-to-modem, Internet, IPX and TCP/IP, or NetBIOS-based network connections. Unfortunately, we encountered major problems with dial-up networking on our multiple test systems. Apparently, this was caused by conflicts between our network cards and CoSession's dial-up networking. Artisoft was



Carbon Copy's Create New Connection wizard works just like the one in Windows.

not expect to find one or more programs that would meet the needs of each and every remote-control user. But, as you'll see, we did find several that deliver a good mix of remote-control and file-transfer features, performance and security.

Compaq Carbon Copy 32 5.0

\$199. Compaq Australia: 1800 368 369; www.compaq.com.au

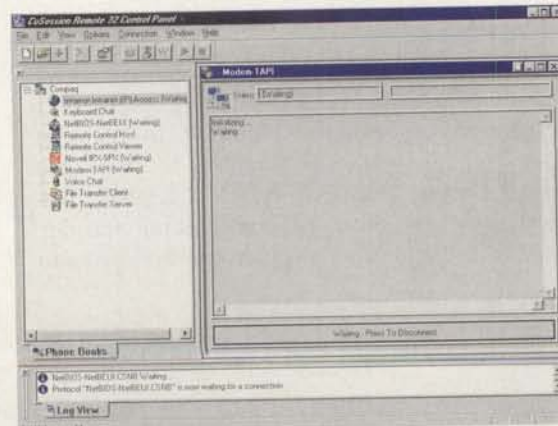
One of the first remote-control products, Carbon Copy—along with the rest of Microcom—was acquired a year ago by Compaq, which has continued to develop it as both a standalone product and as part of the software bundled with its PCs. The latest version, Compaq Carbon Copy 32 5.0, includes powerful wizards for automating tasks, remote printing, voice-over-data communication and enhanced security. A well-rounded offering, it meets the needs of most users but ultimately falls short of Traveling Software's LapLink for Windows NT/95 7.5 and

data) modem.

One of the highlights of Carbon Copy is its file-transfer and synchronisation feature. The program provides an Explorer-like interface, drag-and-drop support and delta file transfers. On our file-transfer tests, Carbon Copy's scores were average.

Carbon Copy boasts a full complement of remote-control features, including remote printing. But the program did not fare as well on our remote-control tests. Under Windows 95, Carbon Copy's scores were in the bottom half of the group. It fared better under Windows NT, turning in the fastest time over a network.

The security features are robust and can be set at several different levels. On Windows NT hosts, the user manager lets you grant file, chat and remote-access



CoSession Remote displays all your connection methods in a single window.

not able to duplicate this problem or offer a solution.

Aside from these conflicts, CoSession's installation was easy. The wizards, which can guide you through either a custom or express setup, were particularly helpful, and the auto-sensing fea-

ture determined communication ports and modems.

When you launch CoSession, the Control Panel screen shows you all of your connection methods and utilities. Though this interface may be confusing to a novice user, we feel that it is a good environment for experienced users such as network administrators. CoSession's Control Panel automatically searches the network or dial-up connection for an available host, but unlike most of the other programs we reviewed, it doesn't provide you with the name of the host that you are controlling—except in some cases under NetBIOS.

CoSession offers the standard remote-control tools (colour scaling, screen scaling and the ability to *disable wallpaper* and screen savers). The role-reversal feature lets the guest and the host switch roles without having to end their session and reconnect. But CoSession's performance on remote-control tasks was poor. Under Windows 95, it had the slowest times on all three connection types. Performance under NT was slightly better.

The file-transfer features are fairly complete, offering file transfer (one-way copy), synchronisation (bidirectional) and cloning (overwrites the selected files, folders or drives). Like Traveling Software's LapLink and Symantec's pcAnywhere, CoSession can clone individual folders or entire drives. As with most entries here, it can also perform delta file transfers. On our tests, the program performed one of the fastest delta file transfers in this roundup. Otherwise, its file-transfer speeds were below average.

CoSession supports user names, passwords, groups and encryption for both data and log-on information. In testing, we were able to determine what components a user could access, then assign read/write privileges on the host PC. To further protect the server, you can run the host component as a Windows NT service.

This program offers some useful tools that can benefit a help desk. *But the telecommuter looking for a dependable dial-up connection and a robust feature set will find better options here.*—Steve Rigney

LapLink for Windows NT/95 7.5

\$199. Hot Key; 02 9922 5199; www.travsoft.com

www.zdnet.com.au

Editors' Choice

• pcAnywhere32 8.0



Symantec's pcAnywhere32 8.0 makes all of the right connections. It offers an array of remote-control and file-transfer features, provides more robust

security and integrates with Windows NT. It also notched excellent scores across the board on our performance tests. Together, these traits make pcAnywhere the clear choice for remote control.

No matter what platform you use, you'll find a compatible pcAnywhere client. The version we tested supports Windows 95, Windows NT, Windows 3.x and DOS. Symantec also offers Windows CE and browser-based clients. It supports all the expected connection types as well as some extras.

New remote-control features include integration with videoconferencing applications and the ability to match the host video resolution with the guest. In the file-transfer category, pcAnywhere offers

delta file transfer. In addition to its powerful scripting language, it has an AutoXfer wizard for building tasks that can be invoked manually or put on a schedule.

One of the biggest areas of improvement in this version is its security. pcAnywhere now supports the Microsoft Crypto API. In addition, the program adopts Windows NT's users and security settings and can save remote-control sessions in Windows NT's event log. You can also control user access to drives and limit session time.

Whether you're planning to squeeze a few extra hours out of each workday by dialling in from home or need a company-wide remote-control solution, pcAnywhere is the answer.

Traveling Software's LapLink has long had a reputation as one of the best file-transfer programs. New features such as wizard-driven synchronisation agents and an adaptive compression scheme further solidify its status. And LapLink is still one of the top performers in this category. But as a remote-control client, LapLink for Windows NT/95 7.5 is missing some key features, including drive mapping and printer redirection.

LapLink is available in several configurations. LapLink for Windows NT/95 7.5 includes a parallel cable. Traveling Software also offers Remote DeskLink (\$99), a more limited package for telecommuters, as well as LapLink Tech (\$299), a product for PC support professionals.

LapLink supports network (TCP/IP and IPX), dial-up networking, Internet, direct cable, modem-to-modem and infrared connections. We found the program easy to install. The pop-up Quick Steps provide context-sensitive dialog boxes that contain online help for current

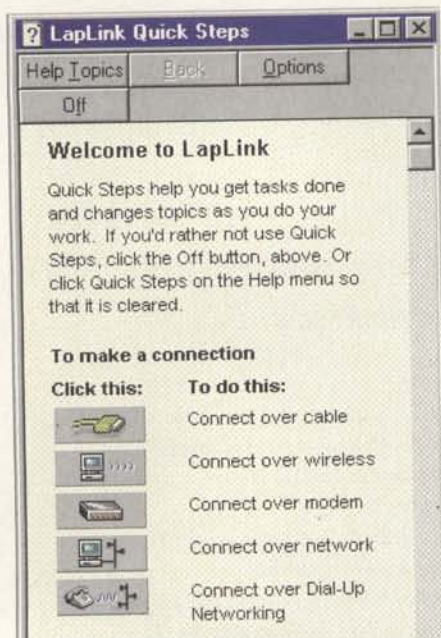
tasks. The only drawback to Quick Steps is that it obscures the main window, but as you become more familiar with the program, you can easily disable it.

LapLink has many tools to simplify file transfer. The new Xchange Agent, which is similar to AutoPilot in Compaq's Carbon Copy and AutoXfer in Symantec's pcAnywhere, lets you create regular file synchronisation routines without delving into a complex scripting language. A useful feature of the synchronisation tool is its ability to preview your settings to ensure that you don't overwrite important files.

LapLink's SpeedSync technology for delta file transfers compares files at the block level. This version of LapLink also features adaptive compression technology, which determines which files to compress based on the bandwidth of your current connection. Together, these features make LapLink one of the best choices for file transfers—a fact borne out by our file-transfer performance tests.

Traveling Software has added some

Remote-Control Software



LapLink's Quick Steps can walk you through all common remote-control tasks.

features to bolster LapLink's remote-control functions. You can now filter out large bitmaps, and LapLink supports caching to improve performance during remote-control sessions. Nevertheless, it is still missing printer redirection and voice chat (both of which are included in LapLink Tech). Although LapLink did not dominate our remote-control tests as it did our file-trans-

fer tests, it posted very respectable scores in this area as well.

The Windows 95 version lacks security options found elsewhere. Although it does offer passwords and encryption, you can't limit access to files or disk drives by user. But you can limit users to specific tools, including remote control, file transfer and chat. Because the Windows NT version inherits Windows NT's user profiles and access rights, it offers a more secure solution.

Among remote-control programs, LapLink offers the fastest and easiest way to transfer a file from point A to point B. Although pcAnywhere generally has a slight edge, LapLink is a fine solution for personal remote control.—SR

NetOp for Windows 5.4

\$399. Checkmark Technologies; 02 9957 6970 or 1800 504 025; www.4ctc.com

NetOp for Windows 5.4, from CrossTec, is a remote-control application designed for one purpose: the corporate help desk. It lacks many features found in programs designed for telecommuters and day extenders, such as robust file-transfer capabilities and remote printing. CrossTec promises that its next version, due out at about the time you read this, will address these shortcomings. In the

meantime, NetOp offers some attractive features for help desk environments.

Unlike most products reviewed here, which bundle the guest and host software for multiple platforms on a single CD, NetOp takes a modular approach, with separate modules for the guest, host, access server and gateway. This design lets the network administrator install only the features that each client needs. A guest/host combination package costs \$399. The access server and gateway, which we did not test, cost \$1375 and \$825, respectively. NetOp supports Windows 95/NT/3.1, DOS and OS/2 Warp. Each of the platforms must be purchased separately.

Installing and configuring NetOp is easy. Like its competitors, the program uses wizards to walk you through the whole process. As with Quarterdeck's Procomm RapidRemote, NetOp's guest and host software consist of two separate components. Unlike RapidRemote, however, NetOp doesn't offer the option of installing both components at once; each must be installed individually.

The interfaces for both guest and host are intuitive and include toolbar buttons for accessing the most frequently used utilities, such as remote control, address book, chat and file transfer. We especially liked

SUITABILITY TO TASK

	Compaq Carbon Copy 32 5.0	CoSession Remote 32 8.1	LapLink for Windows NT/95 7.5	NetOp for Windows 5.4	pcAnywhere 32 8.0	Procomm RapidRemote 1.51	ReachOut Enterprise 8.0	Remotely Possible 4.0
Setup and configuration	Excellent	Fair	Excellent	Fair	Excellent	Good	Good	Fair
Remote control	Good	Fair	Good	Good	Excellent	Good	Good	Fair
File transfer	Good	Good	Excellent	Poor	Good	Good	Fair	Fair
Security	Excellent	Good	Fair	Fair	Excellent	Good	Good	Good

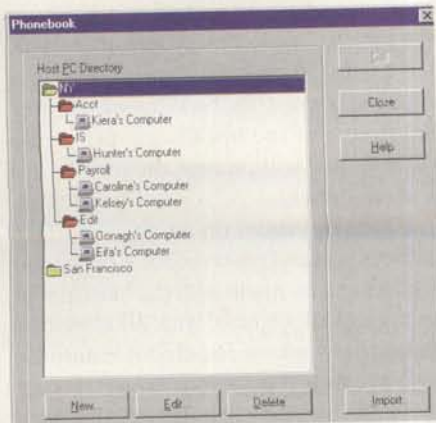
The **setup and configuration** of remote-control software can be complex, because the application must be installed on two systems and configured to work with existing communications hardware and software. In addition to the actual installation, factors we consider are the program's ability to recognize modems, its integration with Windows' Dial-Up Networking, and the procedure for creating new host and guest connections. Most of the products we looked at include wizards that facilitate configuration.

The fundamental role of remote-control software is to take over a system remotely and make it appear as though the user were at the host's keyboard. To gauge a program's proficiency at **remote control**, we rate its ability to negotiate differing screen resolutions and faithfully replicate screen elements. To boost performance, many products can also disable the host wallpaper and screen saver. Other features in this category include drive mapping, printer redirection, and the ability to use voice chat in conjunction with remote control.

Remote-control software lets a user keep files and folders on two or more PCs in sync. Although **file transfer** sounds simple, vendors have found many ways to enhance the process.

The better programs use a standard, Windows Explorer-like interface and support drag-and-drop and long filenames. In addition to copying a file from one location to another, remote-control programs can synchronize files or folders between two PCs (bidirectional) and clone entire folders or drives. To improve performance of file transfers, most programs support delta transfers, which copy only the changed portions of a file. Most products also provide wizards, scripting engines, or both for automating file transfers. Finally, we test each program's ability to resume a file transfer after a disconnection.

As more remote users rely on the Internet, **security** becomes critical. Standard features include the ability to make the host screen blank and disable the keyboard and mouse during a remote-control session. These products should also provide passwords and access rights based on user profiles. Some programs integrate with Windows NT's user profiles and access rights. Additional security features include the ability to force a reboot of the host after being disconnected, set time limits on sessions, encrypt data that is being transferred, and log remote-control sessions. A couple of programs here also have antivirus software.



Large organisations will appreciate NetOp's Phonebook, which organises host PC connections into groups.

NetOp's hierarchical, graphical Phonebook feature: hosts are placed in file folders to distinguish them more easily from one another. Hosts in payroll, for example, can be placed in a separate folder from the hosts in accounting. The NetOp host supports up to ten simultaneous guest connections. In our remote-control performance tests, the unit notched the fastest time by far over a network under Windows 95. This alone makes NetOp worth a look if you are seeking a help desk solution. Its scores on the other tests were average.

NetOp's file-transfer capabilities are rudimentary. Instead of an Explorer-like interface, it provides a dialog box that lets you browse through directories and select To and From locations. NetOp lacks drag-and-drop support and offers no tools for automating file synchronisation tasks. It also lacks true delta file synchronisation. Instead, it scans files, and when it detects any change, it copies the rest of the file from that point. In our tests, this method showed little or no performance advantage.

By default, NetOp's security offers full access to all users, which means it is up to you to close the door and let in only authorised users. When configured properly, the model provides a very granular breakdown of guest access privileges. It can enforce passwords, limit access by Mac or IP address and restrict access to utilities such as chat.

Large organisations looking for a flexible help desk solution that supports OS/2 should consider NetOp, but most users will be better off with another program.—PBs

www.zdnet.com.au

pcAnywhere32 8.0

\$269. Symantec Australia; 02 9850 1005; www.symantec.com.au



Symantec's pcAnywhere commands a significant share of the remote-control market. After testing the latest version, pcAnywhere32 8.0, it's easy to see why. The program supports a vast array of platforms; offers comprehensive remote-control, file-transfer and security features; and consistently delivers above-average performance. Version 8.0 adds better Windows NT support and the ability to connect multiple guests to a single host, making pcAnywhere the program of choice.

Out of the box, pcAnywhere supports Windows 95, Windows NT, Windows 3.x and DOS. Registered users can download free browser-based remote-control clients (available as an ActiveX control, Java applet, or Netscape Navigator plugin), and Symantec also offers a client for Windows CE. The Windows client we tested supports network (Banyan's VINES, IPX/SPX, NetBIOS/NetBEUI and TCP/IP), dial-up networking, wireless, direct cable, infrared, modem-to-modem and ISDN connections.

The basic remote-control features are all present in pcAnywhere, but Symantec adds some extras. For instance, during remote-control sessions, you can switch from data to voice or even videoconferencing via integration with White Pine Software's Enhanced CU-SeeMe 3.0. This version also has the ability to synchronise the video resolution of the host to the guest, and it maps left-hand/right-hand mouse clicks between PCs.

To boost performance, pcAnywhere queues the host screen and caches it as a single bitmapped image before sending it to the remote—producing some of the fastest refresh rates we tested. But this approach has some drawbacks. For example, the guest PC may miss a dialog box if it appears only briefly on the host PC's screen. And pcAnywhere can be slow on tasks such as typing and scrolling. Yet pcAnywhere posted some of the best scores, including the fastest times when using dial-up networking under Windows 95 and Windows NT.

The file-transfer tool is straightfor-

ward. You can drag and drop files between the guest and host PCs. To increase transfer speeds, pcAnywhere uses compression and supports delta file transfer. A wizard-driven AutoXfer agent lets you automate file synchronisation chores, and pcAnywhere includes a powerful scripting language. In our tests, pcAnywhere notched above-average file-transfer scores across the board, especially on our highly compressible 200KB file.

Some of the key improvements in this version concern security. In addition to user names, groups and passwords, pcAnywhere supports the Microsoft Crypto API, which lets you use public/private key or symmetrical encryption (40- or 128-bit key lengths) to protect your data in transit. We also liked its ability to authenticate users with the Windows NT user manager and domains. pcAnywhere stores any intrusion alerts in its own log file or the NT Event Log. Other security features let you control drive access, limit a user's connection time, and automatically reboot the host on disconnect. Finally, pcAnywhere includes Norton AntiVirus.

Fast, secure and full-featured, pcAnywhere is truly the best way to access a PC from anywhere.—SR

Procomm Rapid Remote 1.51

\$99.95 Quarterdeck; 1800 659 041; www.quarterdeck.com.au

For a relatively low price (\$99.95), Quarterdeck's Procomm RapidRemote 1.51 provides a lot of bells and whistles. With features such as data encryption, printer redirection, and the Connection Manager, RapidRemote is a good alternative for both basic dial-in remote-control and help desk users.

The unit is compatible with Windows 95, Windows NT and Windows 3.x. It can connect via dial-up modem, TCP/IP and SPX networks, or directly via a serial cable.

We found RapidRemote one of the easiest products to install and use. Even novice users should be able to complete installation in minutes. Like CrossTec's NetOp for Windows 5.4, RapidRemote divides guest and host software into two distinct components. During installation, you may choose whether you want to install both or just one of them.

SmartWizards is a useful feature that helps you set up your users, hosts, clients

Remote-Control Software

and hardware. One wizard even detected the IP address of our host PC.

The interface is fairly basic and includes icons for performing tasks such

average. Under Windows NT, it excelled over modem-to-modem connections.

The program's security features include user names, passwords, encryption, intruder detection and callback. The built-in audit trail lets you see who's logged on, any failed attempts, and the names of the files a user transferred. You can place limits on the length of sessions, and the Hacker Protection feature can lock down the system for a preset time. About the only thing missing from RapidRemote is a wizard or scripting utility to automate tasks. Otherwise, it is a thorough program that performs well across the

95 clients, however, we had to update our Winsock to Version 2.0 in order to use IPX and TCP/IP protocols. Though this file is included on the CD, the Winsock upgrade is not part of the installation procedure (Version 8.0 will prompt the user to upgrade Winsock).

ReachOut relies on a single interface for both host and guest modes. Connection profiles can be made with the help of wizards. Tightly integrated with Windows 95's dial-up networking, ReachOut Enterprise makes remote connections a seamless task.

The centralised installation and management functions offer a great way to manage remote access in the enterprise, letting network administrators configure options and apply them to all installations.

The zero admin host service feature launches the host component on a system when it is turned on. The host component resides quietly in the background, so a help desk administrator can easily take control of the system for troubleshooting.

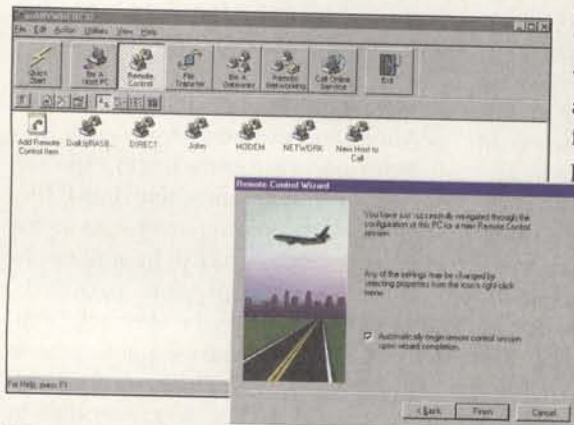
ReachOut Passport lets users connect to a host over an intranet or the Internet without having the remote-control software installed locally. Instead, a guest can establish a connection via Microsoft Internet Explorer or Netscape Communicator.

A scripting tool automates tasks. This tool is not for novices, however. Unlike products that offer wizards to create tasks, ReachOut requires you to create batch files in a separate text editor.

ReachOut's file-transfer and synchronisation utility is easy to use, but we discovered a bug that prevents the delta file transfer from working properly. Stac says it will have a patch to correct the problem by the time you read this. We also encountered a problem with synchronisation: when a file and a directory had the same name, transfers didn't take place.

In our file-transfer tests, ReachOut had average to poor scores except for the highly compressible and 845KB database file under Windows 95 dial-up networking. In our remote-control tests, its performance over network connections was notable.

ReachOut's security is fairly robust, letting you specify access control to host files and times at which a user can connect. It also includes Network Associates' McAfee VirusScan for protection when transferring files. Windows NT hosts have the option of using either Microsoft's local



Wizards in pcAnywhere make it easy to create and configure connections.

as editing an entry and disconnecting. The Host program lets you pick the type of connection to answer and provides information on current callers. Call Manager, the remote utility, lets you create new entries for connecting with hosts.

When connecting over the Internet, you must first establish a connection on both sides and then use the standard TCP/IP option to find the host. Other products, such as Symantec's pcAnywhere, will actually help you establish your Internet connection and search for a host.

We found the remote-control feature extremely easy to initiate and use. You can view the host screen in a window or scale to full screen. To improve performance, you can turn off the desktop background and high-resolution colours. RapidRemote also lets you simultaneously connect to multiple host PCs.

In our tests, RapidRemote garnered only average scores for dial-up remote control. It did produce, however, the fastest remote-control capabilities for modem-to-modem connections under Windows 95.

RapidRemote's Explorer-type file-transfer utility makes the process easy. To improve performance, the unit offers data compression and delta file synchronisation. It posted the fastest time on our delta file transfer test under Windows 95 dial-up networking; other Windows 95 scores were

board. —SR

ReachOut Enterprise 8.0

\$402. Express Data: 02 9427 9640: www.stac.com

With the release of ReachOut Enterprise



The file-transfer window in RapidRemote looks and acts like that in Windows Explorer.

8.0, Stac has shifted the focus of its veteran remote-access client. By adding new tools, such as centralised management and tighter security, Stac has targeted the program at enterprise and help desk environments. But ReachOut Enterprise lacks some standard features, and we found problems with its file-transfer utility.

ReachOut Enterprise is available in a network-only or modem/network version. The latter, which we tested, supports modem-to-modem, LAN, Internet and ISDN connections.

The program provides a series of wizards that ease installation and configuration. During the installation on Windows

Remote-Control Software

security model or ReachOut Enterprise's.

Stac has added some compelling features for corporate help desks and system administration to this version. But until Stac resolves the problems with its file-transfer features, we recommend you look elsewhere. —PB

Remotely Possible 4.0

\$179. Computer Associates International; 1800 800 237; www.cai.com

The standalone version of Remotely Possible 4.0 is also sold as part of Computer Associates' network management suite. The product has some nice features, such as the ability to record sessions. But it has a poor file-transfer tool, and on our tests we encountered problems. Unless you already use CA's Unicenter TNG network management suite, you should look elsewhere for a remote-control solution.

Remotely Possible supports Windows 95, Windows NT 3.51 or later, Windows 3.1 and DOS. Connection options include IPX,

PPP, RAS, TCP/IP and modem-to-modem. The program also provides the only remote-control solution for Alpha-based Windows NT servers.

Like many of the other remote-control packages, Remotely Possible uses wizards to ease installation. And like pcAnywhere, the program offers a push feature, letting administrators install it remotely onto clients. Unfortunately, it works only under Windows NT.

Our remote-control experience was not as hassle-free as the installation. In our tests, we discovered two problems. The first, related to the file-transfer feature, was easily fixed by a patch supplied by CA. The second problem had to do with a video conflict between the remote viewer and the host. This required us to edit the Windows registry manually.

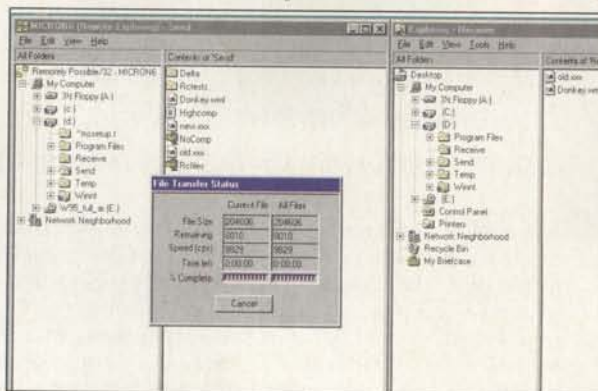
According to CA,

the video problem was triggered by our test systems' video drivers, but no other product we tested had such problems.

We found the remote-control feature fairly easy to initiate but a bit confusing at first. By default, it opens in full-screen mode with no toolbar or any other sign of how to return to the local screen. After learning a few shortcuts, however, we were able to switch back. Remotely Possible can access multiple hosts at one time

and offers a Stealth Mode that lets you view remote hosts without being detected.

The file-transfer utility has an awkward interface. On execution, an Explorer-like box pops up representing the host's drives. But to view the local drive's contents, you must open Windows Explorer manually. The file-transfer feature supports crash recovery and drag-and-drop but doesn't offer file synchronisation. Furthermore,



To transfer files with Remotely Possible, you must use Windows Explorer to view and access local files.

drag-and-drop didn't always function properly. In our tests, Remotely Possible had below-average file-transfer scores.

Remotely Possible's security is fairly robust. In addition to the standard password protection, it offers multiple levels of security and integrates well with Windows NT's user administrator. According to CA, much of Remotely Possible's strength lies in its integration with Unicenter TNG. But for a standalone remote-control solution, Remotely Possible lacks the ease of use and capabilities provided by competitors such as Symantec's pcAnywhere. —PB

ReachOut Event Viewer - C:\PROGRAM FILES\REACHOUT\REACHOUT.ELG

Log View Help

Date	Time	Type	Source	Description	User
5/11/98	9:59:51 AM	Information	ReachOut Explorer	Sending file Boot...	DSA
5/11/98	9:59:51 AM	Information	ReachOut Explorer	Sending file Bo...	DSA
5/11/98	10:02:37 AM	Information	ReachOut Explorer	Sending file Bo...	DSA
5/11/98	10:02:37 AM	Information	ReachOut Explorer	Sending file Bo...	DSA
5/11/98	10:13:08 AM	Success Audit	Service	admin attempted...	DSA
5/11/98	10:13:08 AM	Information	Service	Connection medi...	DSA
5/11/98	10:13:17 AM	Success Audit	Service	admin attempted...	DSA
5/11/98	10:19:18 AM	Information	Service	DLL "C:\Program...	DSA
5/11/98	10:19:18 AM	Information	Display	ReachOut displa...	DSA
5/11/98	10:19:25 AM	Information	Service	DLL "C:\Program...	DSA
5/11/98	10:19:25 AM	Information	Service	DLL "C:\Program...	DSA
5/11/98	10:19:25 AM	Information	Service	DLL "C:\Program...	DSA
5/11/98	10:20:46 AM	Information	ReachOut Explorer	Changed current...	DSA
5/11/98	10:20:59 AM	Information	ReachOut Explorer	Receiving file R...	DSA
5/11/98	10:20:59 AM	Information	ReachOut Explorer	Receiving file R...	DSA
5/11/98	10:20:59 AM	Information	ReachOut Explorer	Deleted file des...	DSA
5/11/98	10:20:59 AM	Information	ReachOut Explorer	Renamed file R...	DSA

For Help, press F1

561 events 640

ReachOut offers several features for network administrators, including a detailed event log.



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PERFORMANCE TESTS

Remote-Control Software



The market leaders in the remote-control category, Symantec's pcAnywhere 32 8.0 and Traveling Software's LapLink for Windows 95/NT 7.5, are also the performance leaders on our tests.

Both products performed well, but pcAnywhere excelled on our remote-control tests, and LapLink retained its edge on our file-transfer tests. The margins between top performers—which also includes Compaq Carbon Copy 32 5.0 and Quarterdeck's Procomm RapidRemote 1.51—were small, and we feel that most users will be satisfied with these packages. But although performance is critical, remote-control and file-transfer features, security and ease of use are equally important.

To gauge performance, we tested programs in two key areas: remote control and file transfer. Our remote-control tests measure a program's ability to redraw screens quickly when performing everyday tasks. Our file-transfer tests gauge performance on a variety of transfers including a delta file transfer, which copies only changed portions of files. The tests were performed under both Windows 95 and Windows NT over three connection types—modem-to-modem, dial-up networking and network—but for file transfers, only the first two types are reported here.

Remote Control

The top performers on our remote-control tests were LapLink, pcAnywhere and RapidRemote. When you look at the individual tasks that make up the test files, however, some interesting trends emerge. For example, pcAnywhere is the speediest when it comes to launching a graphics-intensive application, such as Netscape Communicator, and drawing screens with graphics. This is because of that program's screen-caching method. Rather than dividing a screen into elements such as toolbars, text areas and graphics, pcAnywhere transfers each screen as a single, bitmapped image. On our screen-caching tasks, it was eight times as fast as its competitors on all connection types tested under Windows 95. By contrast, programs that do not support screen caching, such as Artisoft's CoSession Remote 32 8.1, did poorly here. Note that CoSession's performance on the network under Windows 95 was unusually slow relative to its speed under Windows NT. Artisoft claims that performance can be affected by other network protocols installed on the system, but even with only TCP/IP installed, we obtained similar subpar results.

Screen caching has its drawbacks, however. When making minor changes to a document, programs using screen caching will attempt to redraw the screen each time a change is made. This can have a big impact on performance time. For instance, on our typing task, pcAnywhere took 8.5 seconds longer than CrossTec's NetOp for Windows 5.4 when using a modem-to-modem connection under Windows 95.

(continues)

REMOTE CONTROL

Bold type denotes first place.

PC denotes Editors' Choice

Modem-To-Modem Dial-Up Networking Network

Minutes:seconds

WINDOWS 95

Compaq Carbon Copy 32 5.0

5:25
4:24
1:28

CoSession Remote 32 8.1

8:44
9:42
7:32

LapLink for Windows NT/957.5

3:06
3:16
1:39

NetOp for Windows 5.4

4:11
4:01
0:49

PC pcAnywhere 32 8.0

2:51
3:09
1:14

Procomm RapidRemote 1.51

2:33
3:42
1:21

ReachOut Enterprise 8.0

5:02
3:11
1:14

Remotely Possible 4.0

N/A
7:05
2:34

WINDOWS NT

Compaq Carbon Copy 32 5.0

5:22
4:23
1:06

CoSession Remote 32 8.1

4:38
4:36
1:35

LapLink for Windows NT/957.5

3:41
4:06
1:05

NetOp for Windows 5.4

4:48
6:42
2:04

PC pcAnywhere 32 8.0

3:13
3:30
1:28

Procomm RapidRemote 1.51

3:29
9:00
1:19

ReachOut Enterprise 8.0

5:02
4:51
1:10

Remotely Possible 4.0

N/A
4:16
1:11

◀ BETTER

N/A—Not applicable; Remotely Possible could not complete this test because of a conflict between its video-caching algorithm and major productivity applications used in our testing.

● Remote Control Traveling Software's LapLink for Windows NT/95 7.5 and Symantec's pcAnywhere 32 8.0 set the pace for remote-control performance. Of the six tests we performed (modem-to-modem, dial-up networking and network under both Windows 95 and Windows NT), pcAnywhere posted scores among

the three fastest in five cases, and LapLink ranked in the top three in four instances. pcAnywhere was especially strong on dial-up networking tests. Stac's ReachOut Enterprise 8.0 also performed well under Windows 95, as did Carbon Copy 32 5.0 under Windows NT.

PERFORMANCE TESTS

(continued)

File Transfer

LapLink, the veteran of the file-transfer industry, is still the one to beat here, performing consistently well on all versions of our file-transfer tests. Near the top were pcAnywhere and Carbon Copy.

In general, we found that file-transfer performance decreased when we switched from modem-to-modem to dial-up networking. Under Windows 95, the average difference when switching from modem-to-modem to dial-up networking ranged from about 1 second to 10 seconds, depending on the test. Under Windows NT, the difference was more apparent, ranging from more than 4 seconds to 16 seconds.

To determine how effective each program is at compressing, we performed tests using both highly compressible and non-compressible files. Each program has its own approach to file compression. Carbon Copy bases its compression on the file type. LapLink, on the other hand, bases its compression on available bandwidth regardless of the file type. pcAnywhere uses streaming compression in which all data is compressed, whether you are transferring a file or performing remote control.

Since LapLink first introduced delta file transfers, nearly all products in this category have followed suit, with the exception of NetOp and Remotely Possible 4.0. NetOp offers what CrossTec calls a modified delta. It performs a linear byte count until it detects a change and then transfers the remainder of the file from that point. Our tests showed that NetOp's approach yields varying results, depending on where the changes in the file are located. Stac claims that ReachOut Enterprise 8.0 supports delta file transfers, but we discovered a bug in the program that prevented the feature from working properly. Stac has acknowledged

this glitch. Of the products that can perform true delta file transfers, Carbon Copy, RapidRemote and CoSession were the top performers, with LapLink and pcAnywhere close behind.

How We Tested

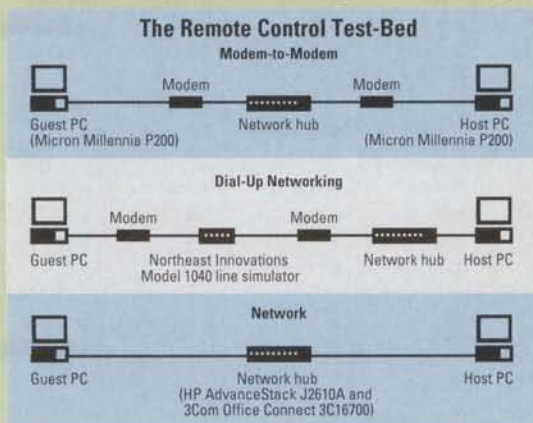
The remote-control tests comprise a series of 20 steps, which include launching Netscape Communicator, navigating Web pages, opening Microsoft Word documents, and navigating within documents and between applications. We ran these tests using three connection types; each step was timed manually, and we report the sum of all the steps. The screen resolution of the guest and host PCs were set at 1024 x 768 with a colour depth of 256-bits.

Our file-transfer tests comprise four file types: a 200KB highly compressible file (93 percent compressible), a 200KB noncompressible file, an 845KB database file (78 percent compressible), and a delta file transfer using a modified version of the database file.

Apart from configuring remote control to full-screen mode, we tested each product using its default settings. Our test systems (both guest and host) were Micron Millennium PCs with 200MHz Pentium processors, 32MB RAM, and Diamond Multimedia Systems' Diamond Stealth 3D 2000 graphics cards. On Windows 95 tests, both the guest and host were running Windows 95.

On the Windows NT tests, the guest and host were running Windows NT 4.0 Workstation. For the Modem-to-Modem and Dial-Up Networking tests, we used U.S. Robotics' Courier V.Everything (Version 34) modems running at 33.6kbps and a Northeast Innovations Model 1040 telephone-line simulator. Our Network and Dial-Up Networking tests were performed on a TCP/IP network.

—Analysis written by Diane Jecker



FILE TRANSFER

Seconds	Modem-To-Modem				Dial-Up Networking			
	200K files		Delta File Transfer		200K files		Delta File Transfer	
Bold type denotes first place. PC denotes Editors' Choice	Highly Compressible	Noncompressible	Full file (845K)	Delta	Highly Compressible	Noncompressible	Full file (845K)	Delta
WINDOWS 95								
Compaq Carbon Copy 32 5.0	6.0	24.4	67.1	5.7	6.0	32.6	66.5	8.3
CoSession Remote 32 8.1	13.2	25.4	62.2	6.3	15.6	34.9	91.1	6.0
LapLink for Windows NT/95 7.5	6.2	22.0	50.2	6.5	7.1	23.4	51.5	7.1
NetOp for Windows 5.4	5.9	25.4	57.0	N/A	6.7	28.2	73.0	N/A
PC pcAnywhere32 8.0	5.8	23.6	58.0	9.1	6.1	25.4	62.9	9.6
Procomm RapidRemote 1.51	6.0	25.2	64.5	12.4	10.4	30.9	86.3	4.7
ReachOut Enterprise 8.0	6.2	36.5	59.6	145.7*	6.0	34.8	59.7	114.5*
Remotely Possible 4.0	11.2	29.7	68.4	N/A	9.0	29.7	81.3	N/A
WINDOWS NT								
Compaq Carbon Copy 32 5.0	5.8	24.3	67.4	5.4	5.7	24.1	70.1	5.7
CoSession Remote 32 8.1	13.0	25.5	64.7	5.8	33.0	44.3	106.8	5.9
LapLink for Windows NT/95 7.5	6.4	22.6	50.7	7.2	7.5	24.3	53.8	7.0
NetOp for Windows 5.4	5.7	23.0	56.9	N/A	20.5	32.3	78.4	N/A
PC pcAnywhere32 8.0	5.4	23.8	59.8	9.4	7.2	30.7	78.3	11.1
Procomm RapidRemote 1.51	6.2	23.3	58.6	4.9	21.8	33.5	80.9	5.8
ReachOut Enterprise 8.0	5.8	34.2	60.3	158.3*	10.0	33.6	66.3	156.3*
Remotely Possible 4.0	12.6	31.1	66.9	N/A	21.7	33.3	78.6	N/A

N/A—Not applicable. This product does not support delta file transfer.

* Although Stac claims that ReachOut Enterprise supports delta file transfers, during testing we discovered a bug in the program that prevents it from working properly.

● File Transfer Just as they did on our remote-control tests, Traveling Software's LapLink for Windows NT/95 7.5 and Symantec's pcAnywhere32 8.0 stood out on our file-transfer tests. In particular, Laplink and pcAnywhere dominated the Windows 95 tests. Compaq Carbon Copy 32 5.0 and Quarterdeck's Procomm RapidRemote 1.51 posted strong scores on the delta file transfer test. Stac's ReachOut Enterprise 8.0 could not perform delta file transfers properly, and its performance suffered here. Computer Associates' Remotely Possible 4.0 does not support delta file transfers, and CrossTec's NetOp for Windows 5.4 performs a modified delta transfer only.

SUMMARY OF FEATURES

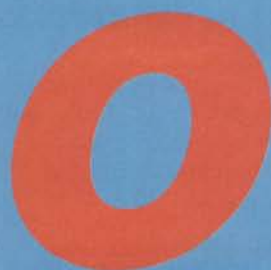
Remote-Control Software



	Compaq Carbon Copy 32 5.0	CoSession Remote 32 8.1	LapLink for Windows NT/95 7.5	NetOp for Windows 5.4	pcAnywhere 32 8.0	Procomm RapidRemote 1.51	ReachOut Enterprise 8.0	Remotely Possible 4.0
■ YES ■ NO								
Street price	\$199	\$129	\$199	\$399	\$269	\$99.95	\$402	\$179
Technical-support number	1300 368 369	03 9929 9733	02 9966 1425	1800 504 025	02 9850 1050	03 9929 9722	02 9427 9640	1800 023 386
Technical-support hours (eastern time)	8:30-8:30 M-F 10-7 S.S.	9:00-5:00 M-F	8:30-5:30 M-F	24 hours	9:00-5:00 M-F	9:00-5:00 M-F	9:00-5:00 M-F	24 hours
Supports TAPI (Telephony API)	■	■	■	■	■	■	■	■
Setup								
Automatically configures modem	■	■	■	■	■	■	■	■
Supports Plug and Play	■	■	■	■	■	■	■	■
Remote installation	■	■	■	■	■	■	■	■
Connections								
Serial/parallel/ECP port	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Analogue modem/ISDN adaptor	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
LAN/Internet/RAS	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Wireless IrDA	■	■	■	■	■	■	■	■
Integrates with Windows 95 Dial-Up Networking	■	■	■	■	■	■	■	■
DNS/IP/Dynamic IP addresses	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Protocol Support								
IPX/MP/RAS	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
NetBIOS/NetBEUI	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
SLIP/PPP	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
TCP/IP	■	■	■	■	■	■	■	■
Remote Control								
Multiprotocol wait-for-call	■	■	■	■	■	■	■	■
Simultaneous host and guest	■	■	■	■	■	■	■	■
Multiple host/guest connections	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Colour scaling/Redirected printing	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Chat (voice over data)	■	■	■	■	■	■	■	■
Session/permanent caching	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Can disable host PC wallpaper/screen saver	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Includes scripting	■	■	■	■	■	■	■	■
Provides a single interface for host and viewer	■	■	■	■	■	■	■	■
Role reversal/Remote reboot	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Screen resizing/matching	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Host broadcasting	■	■	■	■	■	■	■	■
Can search a subnet	■	■	■	■	■	■	■	■
Windows NT guest controls Windows 3.x/95 hosts	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Windows 95 guest controls Windows 3.x/NT hosts	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Windows 3.x guest controls Windows 95/NT hosts	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
File Transfer								
Restores transfers after interruption	■	■	■	■	■	■	■	■
Delta file transfer/Unattended file synchronisation	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Synchronises directories/drives	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
File compression/encryption	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Terminal emulation/Virus protection	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Security								
Password encryption	■	■	■	■	■	■	■	■
Separate administrative password	■	■	■	■	■	■	■	■
User can set expiration date on password	■	■	■	■	■	■	■	■
Restrict access to drives/directories/files	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Blank screen/Disable keyboard/Disable mouse	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Audit log/Automatic dial-back	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
User can set time limits on sessions	■	■	■	■	■	■	■	■
Roving dial-back/Host lockout/Intruder detection	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Network log-on after attaching to host	■	■	■	■	■	■	■	■
Can schedule when host is enabled and disabled	■	■	■	■	■	■	■	■
Unattended host system is secure	■	■	■	■	■	■	■	■

(1) Only with ASVD/DSVD modems. (2) A bug prevented ReachOut from properly performing this function.

buyer's guide



In the following pages, you'll find a comprehensive roundup of the comparison tests we have run in *PC Magazine Australia* so far in 1998. In addition to serving as an index to these tests, this regular section provides information designed to help buyers make informed decisions on a wide range of products.

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HARDWARE

PENTIUM II NOTEBOOKS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	WINSTONE 98	BATTERY LIFE (H/M)	REVIEWED
Acer TravelMate 7300TE	\$7999	Acer Computer, Ph: 02 9870 1999	PII 266MHz, 64MB SDRAM, 3.6GB HD, 13.3in TFT screen	19.5	0.10	Jul-98
M Compaq Armada 7800	\$10,496	Compaq, Ph: 02 9911 1999	PII 266MHz, 64MB EDO RAM, 4.7GB HD, 13.3in TFT screen	20.6	0.06	Jul-98
Dell Inspiron 3200 D266XT	\$4798	Dell, Ph: 1800 808 312	PII 266MHz, 32MB SDRAM, 3.8GB HD, 13.3in TFT screen	18.5	0.08	Jul-98
Digital HiNote VP765	\$5650	Digital, Ph: 02 9561 5252	PII 266MHz, 32MB SDRAM, 3.8GB HD, DVD, 13.3in TFT screen	18.4	0.08	Jul-98
E Gateway Solo 9100XL	\$8499	Gateway, Ph: 1800 500 729	PII 266MHz, 64MB SDRAM, 7.6GB HD, 14.1in TFT screen	19.9	0.09	Jul-98
oRIS Madrigal	\$5899	Elcomp, Ph: 03 9429 8033	PII 266MHz, 64MB SDRAM, 2GB HD, 12.1in TFT screen	17.0	0.08	Jul-98
M Tecra 780DVD	\$11,459	Toshiba, Ph: 1800 021 100	PII 266MHz, 64MB EDO RAM, 4.77GB HD, DVD, 13.3in TFT screen	20.1		Jul-98
Twinhead SlimNote EX2.266TG	\$7499	Westan, Ph: 03 9563 6775	PII 266MHz, 64MB RAM, 3.8GB HD, DVD, 13.3in TFT screen	19.2	0.09	Jul-98

BUDGET NOTEBOOKS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	WINSTONE 98	CPUmark32	REVIEWED
E Extensa 390C-001	\$2999	Acer Computer, Ph: 02 9870 1999	P166MMX, 32MB EDO, 2GB HD, 12.1in High Scan STN screen	12.5	329	May-98
Dual AIO AD-6200	\$2990	Dual Technologies, Ph: 03 9887 7888	P200MMX, 32MB EDO, 2GB HD, 12.1in DSTN screen	10.9	290	May-98
Dual MVA-660T	\$2995	Dual Technologies, Ph: 03 9887 7888	P166MMX, 32MB EDO, 2GB HD, 12.1in TFT screen	8.9	246	May-98
Everex StepNote 5200SC	\$2990	Dual Technologies, Ph: 03 9887 7888	P200MMX, 32MB EDO, 2GB HD, 12.1in DSTN screen	11.3	320	May-98
M FirstLite 6216D2M	\$2990	Formosa International, Ph: 07 3846 7979	P166MMX, 32MB EDO, 2GB HD, 12.1in TFT screen	11.4	352	May-98
Leo DESIGNote 5200	\$2799	First International, Ph: 02 9748 4566	P133MMX, 32MB EDO, 1GB HD, 12.1in DSTN screen	NA	236	May-98

233MHz NOTEBOOKS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	WINBENCH 98	BATTERY LIFE	REVIEWED
Acer TravelMate 7130TE	\$7999	Acer Computer, Ph: 02 9870 1999	P233MMX, 3GB HD, 32MB SDRAM, 16X CD, 12.1in TFT	67.7	3:59	Jan-98
Compaq Armada 7770	\$9995	Compaq, Ph: 02 9911 1999	P233MMX, 2.87GB HD, 64MB SDRAM, 20X CD, 12.1in TFT	N/A	2:00	Jan-98
Dell Inspiron 3000	\$5999	Dell, Ph: 1800 808 312	P233MMX, 2GB HD, 64MB SDRAM, 20X CD, 13.3in TFT	62.7	2:07	Jan-98
Gateway Solo 9100	\$7999	Gateway, Ph: 1800 500 729	P233MMX, 4.78GB HD, 64MB SDRAM, 16X CD, 13.3in TFT	76.1	3:25	Jan-98
HP OmniBook 3000CTX	\$8738	Hewlett-Packard, Ph: 13 13 47	P233MMX, 3.8GB HD, 80MB RAM, 13.3in TFT	68.8	2:18	Jan-98
E IBM ThinkPad 770	\$12,280	IBM, Ph: 13 24 26	P233MMX, 4.86GB HD, 64MB SDRAM, 14.1in TFT	96.6	2:22	Jan-98
Leo DESIGNote 6000	\$6999	First International Computers, Ph: 02 9870 8077	P233MMX, 3.16GB HD, 32MB EDO RAM, 16X CD, 13.3in TFT	62.1	2:11	Jan-98
M Micron TransPort Xke	\$8283	Dytec, Ph: 1800 062 206	P233MMX, 4.77GB HD, 64MB RAM, 20X CD, 13.3in TFT	N/A	3:31	Jan-98
Omega Dragon	\$4590	Omega Wholesale, Ph: 08 9249 9288	P233MMX, 2GB HD, 32MB SDRAM, 16X CD, 12.1in TFT	55.6	1:26	Jan-98
Toshiba Tecra 750 CDT	\$10417	Toshiba, Ph: 1800 021 100	P233MMX, 4.77GB HD, 32MB RAM, 16X CD, 13.3in TFT	79.0	2:27	Jan-98
Twinhead SlimNote EX	\$8999	Westan, Ph: 03 9563 6775	P233MMX, 3.8GB HD, 64MB RAM, 16X CD, 13.3in TFT	90.7	2:20	Jan-98

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333MHz MULTIMEDIA PCs

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	WINSTONE 98	QUAKEBENCH II (FPS)	REVIEWED
Busi-Soft PII Performance System	\$5599	Busi-Soft Computers, Ph: 03 9890 8900	PII 333MHz, 64MB SDRAM, 6GB HD, DVD, 17in monitor	24.2	56.4	Jun-98
Canda CH598	\$4999	Canda International, Ph: 03 9574 9760	PII 333MHz, 64MB SDRAM, 6GB HD, DVD, 17in monitor	22.9	34.6	Jun-98
Evolution Multimedia	\$5795	Compu Centre, Ph: 03 9642 5999	PII 333MHz, 128MB SDRAM, 2 x 4.1GB HD, DVD, 17in monitor	23.3	70.5	Jun-98
Dell Dimension XPS D333	\$3749	Dell, Ph: 1800 808 312	PII 333MHz, 64MB SDRAM, 7.8GB HD, DVD, 15in monitor	21.4	34.3	Jun-98
Deltacom LX PTII	\$3699	Alfa Computers, Ph: 02 9317 3344	PII 333MHz, 128MB SDRAM, 4GB HD, 32X CD-ROM, 17in monitor	21.7	34.1	Jun-98
E G&A Spirit 333	\$4695	G&A Computer, Ph: 02 9740 4256	PII 333MHz, 64MB SDRAM, 6GB HD, DVD, 17in monitor	23.2	74.1	Jun-98
Gateway G6-333	\$4435	Gateway, Ph: 1800 500 729	PII 333MHz, 64MB SDRAM, 7.8GB HD, DVD, 17in monitor	23.1	36.1	Jun-98
HP Pavilion 8220	\$5999	Hewlett-Packard, Ph: 13 13 47	PII 333MHz, 64MB SDRAM, 7.5GB HD, DVD, 17in monitor	20.2	37.6	Jun-98
Dreamworks 333	\$4895	Landmark Computers, Ph: 02 9985 9988	PII 333MHz, 64MB SDRAM, 7.9GB HD, DVD, 17in monitor	22.6	70.5	Jun-98
SmartPartner II	\$5999	MBI, Ph: 02 9645 6444	PII 333MHz, 128MB SDRAM, 6GB HD, DVD, 17in monitor	20.6	71.8	Jun-98
M PowerPro 98 ATX 333	\$4196	Microarts, Ph: 03 9696 5955	PII 333MHz, 64MB SDRAM, 6GB HD, 32X CD-ROM, 17in monitor	23.3	56.7	Jun-98
Navada PowerMax 333	\$5199	Navada Computers, Ph: 08 9446 4099	PII 333MHz, 128MB SDRAM, 4GB HD, DVD, 17in monitor	22.1	68.5	Jun-98
Olympic Javelin 9000	\$8995	Z-Tek Computers, Ph: 03 9552 2888	PII 333MHz, 128MB SDRAM, 8.5GB HD, DVD, 19in monitor	25.0	57.0	Jun-98

400MHz PENTIUM II PCs

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	WINSTONE 98	WINBENCH 98 BUS.	REVIEWED
Busi-Soft PII Performance System	\$4985	Busi-Soft Computers, Ph: 03 9890 8900	PII 400MHz, 128MB SDRAM, 8.5GB HD, 32X CD-ROM, 17in monitor	39.1	\$116	Aug-98
Compucon Graphics Workstation	\$4675	Compucon, Ph: 02 9417 7166	PII 400MHz, 128MB SDRAM, 6GB HD, 32X CD-ROM, 17in monitor	35.6	\$74	Aug-98
Dell Dimension XPS R400	\$4709	Dell, Ph: 1800 808 312	PII 400MHz, 64MB SDRAM, 7.9GB HD, DVD, 17in monitor	30.5	\$83	Aug-98
M Gateway G6-400	\$4966	Gateway, Ph: 1800 500 729	PII 400MHz, 64MB SDRAM, 9.4GB HD, 32X CD-ROM, 17in monitor	39.6	\$149	Aug-98
Diamond 400	\$4500	Landmark Computers, Ph: 02 9985 9988	PII 400MHz, 128MB SDRAM, 7.9GB HD, 32X CD-ROM, 17in monitor	38.6	\$165	Aug-98
Navada PowerMax 400	\$3875	Navada Computers, Ph: 08 9446 4099	PII 400MHz, 128MB SDRAM, 4GB HD, 36X CD-ROM, 17in monitor	38.5	\$178	Aug-98
E Pioneer 98 PII 400	\$6420	Pioneer Computers, Ph: 02 96902888	PII 400MHz, 128MB SDRAM, 4.2GB HD, 32X CD-ROM, 17in monitor	41.7	\$169	Aug-98
Nautilus 400	\$4599	Uni Tron, Ph: 03 9819 6677	PII 400MHz, 128MB SDRAM, 6GB HD, 32X CD-ROM, 17in monitor	37.1	\$155	Aug-98
ViewMaster PII/400	\$5895	Hallmark Computers, Ph: 03 9562 6789	PII 400MHz, 128MB SDRAM, 6GB HD, DVD, 19in monitor	33.0	\$38	Aug-98

SUB-\$2000 DESKTOPS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	WINSTONE 98	CPU MARK32	REVIEWED
Adelong Advantage K6-2/300	\$1995	Adelong Computers, Ph: 1800 626 345	AMD K6-2/300, 4.3GB HD, 64MB SDRAM, 32X CD, 15in monitor	23.5	709	Oct-98
E Beyond Pentium II Spirit	\$1990	Beyond Computers, Ph: 02 9417 3688	P200MMX, 2.1GB HD, 32MB SDRAM, 32X CD, 15in monitor	16.0	422	Mar-98
Beyond Super-O Pro	\$1990	Beyond Computers, Ph: 02 9417 3688	PII 300, 5.1GB HD, 64MB SDRAM, 32X CD, 15in monitor	24.9	807	Oct-98
Busi-Soft PII 300 Performance	\$1999	Busi-Soft, Ph: 03 9890 8900	PII 300, 5.1GB HD, 64MB SDRAM, 32X CD, 15in monitor	23.6	723	Oct-98
Deltacom 2300	\$1990	Alfa Computers, Ph: 02 9317 3344	PII 300, 4.2GB HD, 64MB SDRAM, 20X CD, 15in monitor	23.5	772	Oct-98
Deluxe Multimedia Pro	\$1920	Queenstand IT, Ph: 07 4639 4666	P200MMX, 3GB HD, 32MB SDRAM, 24X CD, 15in monitor	15.7	423	Mar-98

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Diamond 300	\$1999	Landmark, Ph: 02 9585 9988	PII 300, 4.3GB HD, 64MB SDRAM, 32X CD, 15in monitor	22.2	728	Oct-98
Diamond Lightning 300	\$1999	Landmark, Ph: 02 9585 9988	PII 233, 4GB HD, 32MB SDRAM, 24X CD, 15in monitor	17.9	589	Mar-98
Evolution	\$1995	Compu Centre, Ph: 03 9642 5999	AMD K6-2/300, 4.5GB HD, 64MB SDRAM, 34X CD, 15in mon.	23.6	797	Oct-98
E Evolution Multimedia Pro	\$1995	Compu Centre, Ph: 03 9642 5999	AMD K6/233, 4.1GB HD, 64MB SDRAM, 32X CD, 15in mon.	19.1	515	Mar-98
First 611 300	\$1990	Formosa International, Ph: 07 3846 7979	PII 300, 3.2GB HD, 32MB SDRAM, 32X CD, 15in monitor	16.6	475	Mar-98
G&A Thunder C300LX	\$1999	G&A Computer Technology, Ph: 02 9740 4256	Celeron 300, 3.2GB HD, 64MB SDRAM, 36X CD, 15in monitor	16.6	726	Oct-98
Mirage Computer System	\$1750	Dual Technologies, Ph: 03 9887 7888	Celeron 266, 4.3GB HD, 64MB SDRAM, 32X CD, 15in monitor	15.3	364	Oct-98
Mitac Pursuit PC	\$1999	Synnex Australia, Ph: 1300 651 665	Celeron 300, 3.2GB HD, 32MB SDRAM, 32X CD, 15in monitor	15.9	436	Oct-98
Nicola-1MU micro ATX	\$1995	Pine Cone Computers, Ph: 1800 804 564	Celeron 266, 3.2GB HD, 64MB SDRAM, 32X CD, 15in monitor	N/A	370	Oct-98
PC Extra Discovery II	\$1999	PC Extra, Ph: 02 4722 3711	PII 300, 4.3GB HD, 64MB SDRAM, 32X CD, 15in monitor	23.8	744	Oct-98
Peak Performer II	\$1990	Peak Performance Computer, Ph: 02 9690 0822	PII 300, 3.2GB HD, 64MB SDRAM, 32X CD, 15in monitor	22.9	728	Oct-98
M Pioneer 98 PII 300	\$1999	Pioneer Computers, Ph: 02 9690 2888	PII 300, 4.3GB HD, 32MB SDRAM, 32X CD, 15in monitor	25.5	809	Oct-98
PowerPro 98 MMX	\$1995	Microarts, Ph: 03 9696 5955	P233MMX, 2.1GB HD, 32MB SDRAM, 24X CD, 15in monitor	16.6	475	Oct-98
Stealth						
Ultimate Perfect	\$1850	Ultimate Computing Technology, Ph: 03 9584 2896	Cyrix 6x86MX/PR200, 3.4GB HD, 64MB EDO RAM, 24X CD-ROM, 15in monitor	17.4	441.00	Mar-98
Ultimate Perfect 5300	\$1999	Ultimate Computing Technology, Ph: 03 9584 2896	PII 300, 5.1GB HD, 64MB EDO RAM, 32X CD-ROM, 15in monitor	17.4	441.00	Mar-98
E Master Series PII/233	\$1995	Uni Tron Computers, Ph: 03 9819 6677	PII 233, 3GB HD, 32MB SDRAM, 24X CD, 15in monitor	18.6	606.00	Mar-98
Viewmaster K6/233	\$1995	Hallmark Computers, Ph: 03 9562 6789	AMD K6/233, 3GB HD, 32MB SDRAM, 24X CD, 15in monitor	16.8	516.00	Mar-98
Viewmaster K6-2 3D	\$1999	Hallmark Computers, Ph: 03 9562 6789	AMD K6-2/333, 4.3GB HD, 64MB SDRAM, DVD (opt), 15in mon.	22.6	756	Oct-98
Viewmaster K6/233	\$1979	Hallmark Computers, Ph: 03 9562 6789	PII 300, 4.3GB HD, 64MB SDRAM, DVD (opt), 15in monitor	23.0	743	Oct-98

NETWORKED COMPUTERS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	WINSTONE 98	WORD (LOW-BETTER)	REVIEWED
AcerPower Flex T4000 Net PC	\$1150	Acer Computer, Ph: 02 9870 1999	P233MMX, 32MB RAM, 10/100Mbps NIC, 13.8in monitor			Jun-98
Boundless Viewpoint TC Model 200	\$1102	MUA, Ph: 02 9928 5111	AMD 5x86/133MHz, 4MB RAM, 10Mbps NIC, 13.5in monitor	48		Jun-98
Compaq Deskpro 4000N	\$1895	Compaq, Ph: 1300 368 369	200MMX, 32MB RAM, 10/100Mbps NIC, 13.8in monitor	14.9		Jun-98
Dell OptiPlex N	\$2229	Dell, Ph: 1800 808 312	P200MMX, 32MB RAM, 10/100Mbps NIC, 13.8in monitor	16.4		Jun-98
E HP Net Vectra	\$2232	Hewlett-Packard, Ph: 13 13 47	P166MMX, 32MB RAM, 10/100Mbps NIC, 14in monitor	15.1		Jun-98
E Neoware @workStation Supra-66	\$2569	Conexus, Ph: 02 9975 2799	Intel 80960 RISC/66MHz, 32MB RAM, 10Mbps NIC, 13.7in monitor		51	Jun-98
Tektronix ThinStream 215	\$2060	Tektronix, Ph: 02 9888 0100	NEC R4300/100MHz, 24MB RAM, 10/100Mbps NIC, 14in mon.	58		Jun-98
Wyse Winterm 2510SE	\$2358	Sealcorp, Ph: 02 9878 8888	AMD SC400 486/66MHz, 8MB RAM, 10Mbps NIC, 14in mon.	57		Jun-98
Wyse Winterm 2310SE	\$1813	Sealcorp, Ph: 02 9878 8888	AMD SC400 486/66MHz, 8MB RAM, 10Mbps NIC	58		Jun-98

GRAPHICS WORKSTATIONS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	WINSTONE 98	HIGH-END WINBENCH GRAPHICS	REVIEWED
E Compu Centre	\$13,990	Compu Centre, Ph: 03 9818 5022	2x PII 333MHz, 128MB SDRAM, 4.5GB HD, 21in monitor	32.2	131.0	Apr-98
Dell Workstation 400	\$8829	Dell, Ph: 1800 808 312	PII 300MHz, 128MB RAM, 4GB HD, 17in monitor	25.0	94.2	Apr-98
Microarts	\$12,400	Microarts, Ph: 03 9696 5955	2x PII 333MHz, 128MB RAM, 2 x 4.5GB HD, 21in monitor	30.3	132.0	Apr-98



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Micron Powerdigm Xsu —\$8269—Dytec, Ph: 1800 062 206 —2x PII 300MHz, 128MB RAM, 4GB HD, 18in monitor —NA —120.0 —Apr-98

COLOUR LASER PRINTERS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	PHOTOSHOP FILE PRINT (SEC.)	COLOUR TEXT (SEC.)	REVIEWED
Brother HL-2400C	\$7176	Brother International, Ph: 03 9899 4844	16ppm (black), 4ppm (4-colour)	0.29	0.54	Jun-98
HP LaserJet 5M	\$10206	Hewlett-Packard, Ph: 13 13 47	10ppm (black), 2ppm (4-colour)	0.14	0.86	Jun-98
E QMS Magicolor 2 EX	\$7995	QMS, Ph: 02 9901 3235	16ppm (black), 4ppm (4-colour)	0.56	0.82	Jun-98
Xerox Docuprint C55	\$7107	Fuji Xerox, Ph: 1300 14 11	12ppm (black), 3ppm (4-colour)	0.19	0.96	Jun-98

MONOCHROME LASER PRINTERS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	BATCH JOB AVERAGE (PPM)	REVIEWED
Brother HL-1660e	\$1995	Brother International, Ph: 03 9899 4844	16ppm, 1200x600 resolution	9.34	Jul-98
Epson EPL-N1200	\$1999	Epson, Ph: 02 9903 9000	12ppm, 600x600 resolution	11.52	Jul-98
Fujitsu Print Partner 14ADV	\$2408	Fujitsu, Ph: 02 9776 4789	14ppm, 600x600 resolution	7.92	Jul-98
Digital LN15N	\$3699	Genicom, Ph: 02 9417 6411	14ppm, 2400x600 resolution	7.60	Jul-98
M HP LaserJet 4000TN	\$3099	Hewlett-Packard, Ph: 13 13 47	16ppm, 1200x1200 resolution	9.91	Jul-98
Kyocera FS-3700+	\$2732	Kyocera, Ph: 02 9906 8075	18ppm, 600x600 resolution	12.39	Jul-98
E Lexmark	\$2492	Lexmark, Ph: 02 9930 3555	18ppm, 1200x600 resolution	15.41	Jul-98
Okipage 20n	\$2665	IPL Datron, Ph: 02 9698 8211	20ppm, 600x1200 resolution	14.43	Jul-98
QMS 2060 Image Server	\$9578	QMS, Ph: 02 9901 3235	20ppm, 600x600 resolution	16.29	Jul-98

DIGITAL CAMERAS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	RECORDING MEDIUM	FORMATS	REVIEWED
Agfa ePhoto 307	\$749	Agfa, Ph: 03 9264 7711	640 x 480 CCD, 2in TFT, flash	CompactFlash	JPEG	Mar-98
Agfa ePhoto 780	\$799	Agfa, Ph: 03 9264 7711	1024 x 768 CCD, 1.8in TFT, flash	CompactFlash	JPEG	Oct-98
M Agfa ePhoto 1280	\$1690	Agfa, Ph: 03 9264 7711	1280 x 980 CCD, 2in TFT, flash, 3X zoom	Smartmedia	JPEG	Mar-98, Oct-98
E Canon PowerShot 350	\$899	Canon, Ph: 02 9805 2720	640 x 480 CCD, 1.8in TFT, flash	CompactFlash	JPEG	Mar-98
Canon PowerShot 600	\$1299	Canon, Ph: 02 9805 2000	832 x 608 CCD, flash	PCMCIA	JPEG, TIFF, WAV	Mar-98
Casio QV-100	\$899	Mobex, Ph: 02 9370 9100	640 x 480 CCD, 1.8in TFT	Internal	JPEG	Mar-98
Casio QV-300	\$999	Mobex, Ph: 02 9370 9100	640 x 480 CCD, 2.5in TFT	Internal	JPEG	Mar-98
Epson PhotoPC 600	\$999	Epson, Ph: 02 9903 9000	1024 x 768 CCD, 2in TFT, flash, 3X zoom	Internal	JPEG	Mar-98, Oct-98
M Epson PhotoPC 700	\$1299	Epson, Ph: 02 9903 9000	1280 x 960 CCD, 2in TFT, flash, 2X zoom	Internal	JPEG	Oct-98
Fujifilm DS-300	\$3395	Hanimex, Ph: 02 9466 2900	1280 x 1000 CCD, optical view, flash	PCMCIA	JPEG, TIFF	Oct-98
Fujifilm MX-700	\$1699	Hanimex, Ph: 02 9466 2900	1280 x 1024 CCD, 2in TFT, flash	Smartmedia	JPEG	Oct-98
Kodak DC220	\$1995	Kodak, 1800 335 650	1152 x 864 CCD, 2in TFT, flash, 2X zoom	CompactFlash	JPEG	Oct-98
Kodak DC250	\$898	Kodak, 1800 335 650	756 x 504 CCD, flash, 3X zoom	PCMCIA	Software dependent	Mar-98
Kodak DC260	\$2448	Kodak, 1800 335 650	1536 x 1024 CCD, 2in TFT, flash, 3X zoom	CompactFlash	JPEG	Oct-98

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For comparison, listed prices are from time of testing.

Kodak DC120	\$1475	Kodak, 03 9350 1222	850 x 984, optic vt, flash, 3X zoom	Internal	Software dependent	Mar-98
E Kodak DC210	\$1650	Kodak, 03 9350 1222	1152 x 864, 1.8in TFT, flash, 2X zoom	CompactFlash	JPEG, FlashPix	Mar-98
Minolta Dimage V	\$1895	Minolta, Ph: 02 9370 8917	640 x 480, 1.8in TFT, flash, 4X zoom	Smartmedia	JPEG	Mar-98
Nikon CoolPix 900	\$1299	Maxwell Optical Industries, Ph: 02 9390 0200	1280 x 960, 2in TFT, flash, 3X zoom	CompactFlash	JPEG	Oct-98
Olympus C-840L	\$1499	R Gunz Photographic, Ph: 02 9935 6600	1280 x 960, 2in TFT, flash	Smartmedia	JPEG	Oct-98
Olympus C-1440L	\$2499	R Gunz Photographic, Ph: 02 9935 6600	1280 x 1024, 1.8in TFT, flash, 3X zoom	Smartmedia	JPEG	Oct-98
E Ricoh RDC-4300	\$1799	Ricoh, Ph: 03 9888 7722	1280 x 960, 2in TFT, flash, 3X zoom	Smartmedia	JPEG	Oct-98
Sony Mavica	\$1499	Sony, Ph: 02 9887 6666	640 x 480, 2.5in TFT, flash, 10X zoom	3.5in floppy	JPEG	Mar-98

FLATBED SCANNERS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	SCAN TIME (SEC) 300DPI	INTERFACE	REVIEWED
Agfa Snapscan 310	\$459	Agfa, Ph: 03 9264 7711	300 x 600 optical res., 4800 x 4800 interpolated	43.0	SCSI	Feb-98 / Sep-98
Agfa Snapscan 600	\$949	Agfa, Ph: 03 9264 7711	600 x 1200 optical res., 4800 x 4800 interpolated	32.0	SCSI	Feb-98
E HP 6100C	\$1339	Hewlett-Packard, Ph: 13 13 47	600 x 600 optical res., 2400 x 2400 interpolated	15.0	SCSI	Feb-98
VuLux VL9600	\$199	Innovision, Ph: 03 5831 8833	300 x 600 optical res., 9600 x 9600 interpolated	26.0	Parallel	Feb-98
Primarc MediaStorm 4800	\$269	BBF, Ph: 03 9761 4299	300 x 600 optical res., 4800 x 4800 interpolated	19.0	Parallel	Feb-98
Direct II						
E UMAX Astra 610S	\$235	Computer Enterprises, Ph: 03 9510 9040	600 x 300 optical res., 4800 x 4800 interpolated	56.5	SCSI, Parallel	Feb-98
UMAX Astra 1200S	\$687	Computer Enterprises, Ph: 03 9510 9040	1200 x 600 optical res., 9600 x 9600 interpolated	26.0	SCSI	Feb-98
AcerScan 6105	\$289	Servex, Ph: 02 9870 4868	600 x 1200 optical res., 9600 x 9600 interpolated	17.0	SCSI	Sep-98
Agfa SnapScan EZ	\$339	Agfa, Ph: 03 9264 7711	600 x 1200 optical res., 9600 x 9600 interpolated	59.0	Parallel	Sep-98
Artec ViewStation AM12E	\$169	Hallmark, Ph: 03 9562 6789	600 x 1200 optical res., 9600 x 9600 interpolated	22.0	Parallel	Sep-98
CanoScan FB610	\$399	Canon, Ph: 02 9805 2000	600 x 1200 optical res., 9600 x 9600 interpolated	38.6	Parallel	Sep-98
Epson GT-12000	\$6899	Epson, Ph: 02 9903 9000	800 x 800 optical res., 6400 x 6400 interpolated	14.4	SCSI, Parallel	Sep-98
Epson GT-9500	\$1999	Epson, Ph: 02 9903 9000	600 x 600 optical res., 4800 x 4800 interpolated	10.0	SCSI, Parallel	Sep-98
M Genius ColorPage Life Pro	\$299	BBF, Ph: 03 9761 4299	600 x 1200 optical res., 600 x 1200 interpolated	36.8	Parallel	Sep-98
E HP ScanJet 5100C	\$513	Hewlett-Packard, Ph: 13 13 47	300 x 300 optical res., 1200 x 1200 interpolated	28.4	Parallel	Sep-98
IBM Colour Flatbed	\$359	IBM, Ph: 02 9951 9601	600 x 1200 optical res., 9600 x 9600 interpolated	43.0	Parallel	Sep-98
KTX 9600UP	\$269	Edge, Ph: 02 9353 9200	600 x 1200 optical res., 9600 x 9600 interpolated	52.0	Parallel	Sep-98
Plustek OpticPro 9636T	\$299	Creative Pacific, Ph: 02 9906 8887	600 x 1200 optical res., 9600 x 9600 interpolated	27.0	Parallel	Sep-98
UMAX Astra 1220S	\$698	Computer Enterprises, Ph: 03 9510 9040	600 x 1200 optical res., 9600 x 9600 interpolated	23.5	SCSI II	Sep-98

REMOVABLE STORAGE

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	82MB BACKUP (MIN:SEC)	RESTORE (MIN:SEC)	REVIEWED
Avatar Shark 250 Mobile Hard Drive	\$499	Bits, Ph: 02 9310 3199	Media cost: \$66	2:30:00	2:11:00	Jun-98

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HP SureStore CD-Writer Plus 7200e	\$899	Hewlett-Packard, Ph: 13 13 47	Media cost: \$36 (RW)	5:45:00	2:46:00	Jun-98
Imation SuperDisk Parallel Port Drive	\$249	Imation, Ph: 1800 225 566	Media cost: \$25-\$30	11:48:00	5:45:00	Jun-98
Iomega Jaz 2GB	\$1099	Iomega, Ph: 02 9955 2455	Media cost: \$299	3:38:00	0:35:00	Jun-98
E Iomega ZipPlus	\$379	Iomega, Ph: 02 9955 2455	Media cost: \$25-\$30	2:17:00	1:20:00	Jun-98
SyQuest EZFlyer 230MB	\$299	Westan, Ph: 03 9563 6775	Media cost: \$59	1:39:00	0:55:00	Jun-98
E SyQuest SparQ 1GB	\$399	Westan, Ph: 03 9563 6775	Media cost: \$79	0:52:00	0:40:00	Jun-98
SyQuest SyJet 1.5GB	\$599	Westan, Ph: 03 9563 6775	Media cost: \$159	1:34:00	0:44:00	Jun-98

19IN MONITORS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	REFRESH RATE @ 1600x1200	REVIEWED
AcerView 99c	\$1253	Servex, Ph: 02 9870 4868	0.26 dot pitch	75Hz	Aug-98
E ADI MicroScan 6P	\$1399	AKA Technology, Ph: 02 9630 1588	0.26 dot pitch	75Hz	Aug-98
CTX 1995UE	\$1390	Ocean Office Automation, Ph: 02 9748 6788	0.26 dot pitch	75Hz	Aug-98
Hitachi CM751ET	\$2550	Hitachi, Ph: 1800 032 689	0.22 dot pitch	75Hz	Aug-98
MAG InnoVision DJ800	\$1586	Magtron, Ph: 02 9975 3727	0.22 dot pitch	65Hz	Aug-98
SyncMaster 900p	\$1495	Samsung, Ph: 02 9638 5200	0.25 dot pitch	76Hz	Aug-98
E GDM-400PS	\$2459	Sony, Ph: 1800 226 429	0.25 dot pitch	75Hz	Aug-98
ViewMaster M19SL	\$1199	Hallmark, Ph: 03 9562 6789	0.26 dot pitch	75Hz	Aug-98
M Viewsonic G790	\$2199	Chips and Bits, Ph: 03 9696 1911	0.26 dot pitch	77Hz	Aug-98

FLAT PANEL DISPLAYS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	DOT PITCH	REVIEWED
E Cybercomp Visioneer 1500	\$1899	PSI, Ph: 03 9878 8611	15in TFT, 1024 x 768	0.297	Oct-98
Hitachi PCX-DT3131	\$5500	Hitachi, Ph: 1800 032 689	13.3in TFT, 1024 x 768	0.26	Feb-98
Mag LS5000C	\$2475	Uni Tron, Ph: 03 9819 6677	15in DSTN, 1024 x 768	0.30	Feb-98
Mag LT500C	\$3660	Magtron Monitors, Ph: 02 9975 3727	15in TFT, 1024 x 768	0.297	Oct-98
Mag LT501C	\$4676	Uni Tron, Ph: 03 9819 6677	15in TFT, 1024 x 768	0.30	Feb-98
Magtron PT-1503A	\$3775	Magtron Monitors, Ph: 02 9975 3727	15in TFT, 1024 x 768 (optional touchscreen)	0.297	Oct-98
M Mitsubishi LXA520W	\$2950	Mitsubishi, Ph: 02 9684 7777	15in TFT, 1024 x 768	0.297	Oct-98
NEC Multisync LCD 400V	\$5005	NEC, Ph: 1800 812 796	14.1in TFT, 1024 x 768	0.28	Feb-98
M NEC LCD2000	\$13,974	NEC, Ph: 1800 812 796	20.1in TFT, 1280 x 1024	0.31	Feb-98
Panasonic PanaFlat LC40	\$5660	Panasonic, Ph: 13 26 00	14in TFT, 1024 x 768	0.28	Feb-98
Sony CPD-L150	\$3999	Sony Australia, Ph: 1800 226 429	15in TFT, 1024 x 768	0.297	Oct-98
E Samsung SyncMaster 400TFT	\$5200	Samsung, Ph: 02 9638 5200	14in TFT, 1024 x 768	0.27	Feb-98
E Samsung SyncMaster 500TFT	\$5200	Samsung, Ph: 02 9638 5200	15in TFT, 1024 x 768	0.30	Feb-98
Viewsonic ViewPanel VP140	\$5900	Chips and Bits, Ph: 03 9696 1911	14in TFT, 1024 x 768	0.28	Feb-98
Viewsonic ViewPanel VP150	\$3995	Chips and Bits, Ph: 03 9696 1911	15in TFT, 1024 x 768	0.297	Oct-98

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PERSONAL DATA ASSISTANTS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	OS	SCREEN	REVIEWED
Palm III	\$829	3Com, Ph: 1800 644 606	Palm style	PalmOS 3.0 Mono	200x300	Sep-98
Cassiopeia A-20	\$999	Mobex, Ph: 02 9370 9100	Keyboard	Windows CE 2.0 Mono	640x240	Sep-98
E Cassiopeia E-10	\$699	Mobex, Ph: 02 9370 9100	Palm style	Windows CE 2.0 Mono	240x320	Sep-98
Ericsson MC16	\$1599	Ericsson, Ph: 13 17 29	Keyboard with infrared modem phone link	Windows CE 2.0 Mono	640x240	Sep-98
Everex Freestyle Manager	\$989	TelePacific, Ph: 1300 657 774	Palm style	Windows CE 2.0 Mono	320x240	Sep-98
HP 62DLX	\$1597	Hewlett-Packard, Ph: 13 13 47	Keyboard	Windows CE 2.0 Colour	640x240	Sep-98
Nokia 9000 Communicator	\$1699	Nokia, Ph: 1300 366 733	Keyboard with phone	GEOS 3.0 Mono	640x200	Sep-98
Philips Velo 500	\$1599	Philips, Ph: 1800 144 733	Keyboard	Windows CE 2.0 Mono	640x240	Sep-98
Psion Series 5	\$1099	Vodafone, Ph: 02 9415 7777	Keyboard	EPOC32 Mono	640x240	Sep-98
Rex-3	\$300	Franklin Electronic Publishing, Ph: 1800 882 588	Card style	Proprietary	-Mono 9 lines	Sep-98
Sharp HC-4500A	\$1499	Sharp, Ph: 02 9830 4600	Keyboard style	Windows CE 2.0 Colour	640x320	Sep-98
Sharp MC-G1	\$1099	Sharp, Ph: 02 9830 4600	Phone with organiser	Proprietary Mono	160x239	Sep-98

GRAPHICS CARDS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	GRAPHICS WinMark 98	CARD TYPE	REVIEWED
AccelGraphics AccelStar II	\$700	InterCAD, Ph: 02 9975 7133	AGP, 3Dlabs Permedia 2, 230MHz RAMDAC, 8MB	120.0	(AGP)	Jan-98
ASUS 3DExplorer 3000	\$275	Focal Point Computing, Ph: 03 9525 1144; Compucon, Ph: 02 9417 7166	AGP, nVidia RIVA 128, 230MHz RAMDAC, 4MB	112.0	(AGP)	Jan-98
ATI Xpert @Work	\$537	Sealcorp, Ph: 02 9418 9099	AGP, 3D Rage, 230MHz RAMDAC, 8MB	137.0	(AGP)	Jan-98
ATI Xpert @Play	\$572	Sealcorp, Ph: 02 9418 9099	AGP, 3D Rage Pro, 230MHz RAMDAC, 8MB	137.0	(AGP)	Jan-98
E ATI All-In-Wonder	\$900	Sealcorp, Ph: 02 9418 9099	AGP, 3D Rage, 230MHz RAMDAC, 4MB (8MB)	137.0	(AGP)	Jan-98
Canopus Total3D 128V	\$399	Innovision, Ph: 03 5831 8833	AGP, nVidia RIVA 128, 230MHz RAMDAC, 4MB	94 / 102	(PCI / PCI)	Jan-98, Aug-98
Creative Blaster Exxtreme	\$249	Creative Pacific, Ph: 02 9906 8887	PCI, 3Dlabs Permedia 2, 230MHz RAMDAC, 4MB (8MB)	112.0	(PCI)	Aug-98
Creative Voodoo2 3D	\$399	Creative Pacific, Ph: 02 9906 8887	PCI, 3Dfx Voodoo2, 130MHz RAMDAC, 8MB	N/A	(PCI)	Aug-98
Diamond Stealth II G460	\$349	Chips and Bits, Ph: 03 9696 1911	AGP, Intel i740, 203MHz RAMDAC, 8MB	137.0	(AGP)	Aug-98
Diamond Stealth II S220	\$249	Chips and Bits, Ph: 03 9696 1911	PCI, Rendition V2100, 170MHz RAMDAC, 4MB	69 / 118	(PCI / PCI)	Jan-98, Aug-98
E Diamond Monster 3D II	\$449	Chips and Bits, Ph: 03 9696 1911	PCI, 3Dfx Voodoo2, 130MHz RAMDAC, 8MB	N/A	(PCI)	Aug-98
Diamond Viper V330	\$349	Chips and Bits, Ph: 03 9696 1911	AGP, nVidia RIVA 128, 230MHz RAMDAC, 4MB	112 / 109	(AGP / PCI)	Jan-98, Aug-98
Diamond Fire GL 1000 Pro	\$499	Chips and Bits, Ph: 03 9696 1911	AGP, 3Dlabs Permedia 2, 230MHz RAMDAC, 8MB	131 / 138	(AGP / PCI)	Jan-98, Aug-98
ELSA Winner 2000/Office	\$425	Rexcel, Ph: 02 9743 3144	AGP, 3Dlabs Permedia 2, 230MHz RAMDAC, 4MB (8MB)	105.0	(PCI)	Jan-98
ELSA GLoria Synergy	\$640	Rexcel, Ph: 02 9743 3144	AGP, 3Dlabs Permedia 2, 230MHz RAMDAC, 4MB (8MB)	98.0	(PCI)	Jan-98
Hercules 3D Thriller	\$449	PSI, Ph: 03 9878 8611	AGP, Rendition V2200, 220MHz RAMDAC, 8MB	120.0	(AGP)	Aug-98
Hercules Stingray 128	\$599	PSI, Ph: 03 9878 8611	PCI, 3Dfx Voodoo Rush, 180MHz RAMDAC, 8MB	99.0	(PCI)	Jan-98
Hercules Dynamite 3D/GL	\$399	PSI, Ph: 03 9878 8611	AGP, 3Dlabs Permedia 2, 250MHz RAMDAC, 8MB	106 / 149	(PCI / AGP)	Jan-98, Aug-98
Hercules Terminator 2Xli	\$255	PSI, Ph: 03 9878 8611	AGP, Intel i740, 220MHz RAMDAC, 8MB	127.0	(AGP)	Aug-98
Intergraph Intense 3D Voodoo		Intergraph Computer Systems, Ph: 02 9888 9900	PCI, 3Dfx Voodoo Rush, 220MHz RAMDAC, 6MB	67.0	(PCI)	Jan-98
Jazz Adrenaline Rush 3D	\$425	Tyrell Distributors, Ph: 08 9242 1779	PCI, 3Dfx Voodoo Rush, 190MHz RAMDAC, 6MB	59.0	(PCI)	Jan-98
Leadtek Winfast 3D L2300	\$275	Tech-Excel Distribution, Ph: 02 9417 7898	AGP, 3Dlabs Permedia 2, 230MHz RAMDAC, 8MB	82 / 120	(PCI / AGP)	Jan-98, Aug-98
Leadtek Winfast 3D S900	\$275	Tech-Excel Distribution, Ph: 02 9417 7898	AGP2, Intel i740, 203MHz RAMDAC, 8MB	120.0	(AGP)	Aug-98
Legend Neon AGP	\$109	Legend Technology, Ph: 08 8374 2355	AGP, S3 Trio 3D, 230MHz RAMDAC, 4MB	96.0	(AGP)	Aug-98

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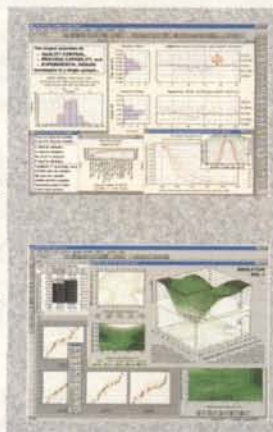
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Matrox Millennium II	\$590	Focal Point Computing, Ph: 03 9525 1144; Compucon, Ph: 02 9417 7166	AGP, MGA-2164W, 250MHz RAMDAC, 8MB (16MB)	108.0	(PCI)	Jan-98
E Matrox Millennium G200	\$356	Focal Point Computing, Ph: 03 9525 1144; Compucon, Ph: 02 9417 7166	AGP2, Matrox G200, 250MHz RAMDAC, 8MB	180.0	(AGP)	Aug-98
Matrox Productiva G100	\$207	Focal Point Computing, Ph: 03 9525 1144; Compucon, Ph: 02 9417 7166	AGP, Matrox G100, 230MHz RAMDAC, 8MB	143.0	(AGP)	Aug-98
E Number Nine Revolution 3D	\$570	Focal Point Computing, Ph: 03 9525 1144;	AGP, Ticket2 Ride, 220MHz RAMDAC, 4MB (8MB)	114.0	(PCI)	Jan-98
Orchid Righteous 3D II	\$645	Q*Soft, Ph: 1300 658 658	PCI, 3Dfx Voodoo2, 130MHz RAMDAC, 12MB	N/A	(PCI)	Aug-98
STB Nitro 3D	\$259	Alfa Computers, Ph: 02 9317 3344	PCI, S3 ViRGE/GX, 170MHz RAMDAC, 4MB	93.0	(PCI)	Jan-98
E STB Velocity 128	\$419	Alfa Computers, Ph: 02 9317 3344	AGP, nVidia RIVA 128, 230MHz RAMDAC, 4MB	111.0	(AGP)	Jan-98
Videologic Apocalypse 5D	\$499	Syslink, Ph: 1800 067 722	PCI, NEC PCX2, 175MHz RAMDAC, 6MB (8MB)	94.0	(PCI)	Jan-98

SOUND CARDS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	16-BIT SAMPLING RANGE	SN RATIO	REVIEWED
E Sound Blaster AWE Gold	\$399	Creative Pacific, Ph: 02 9906 8887	ISA, 64 simultaneous voices, Creative V 32D chipset	5Hz-44.1kHz	>90dB	Feb-98
Monster Sound	\$349	Chips and Bits, Ph: 03 9696 1911	PCI, 32 simultaneous voices, Analog Devices chipset	8Hz-48kHz	>92dB	Feb-98
Ensoniq Audio PCI	\$249	Electric Factory, Ph: 03 9480 5988	PCI, 32 simultaneous voices, AKM-4531 chipset	5Hz-48kHz	>90dB	Feb-98
Aztech SC128-3D	\$149	Westan, Ph: 03 9563 6775	PCI, 128 simultaneous voices, S3 Sonic Vibes chipset	5Hz-48kHz	>80dB	Jul-98
Creative Blaster PCI 64	\$249	Creative Pacific, Ph: 02 9906 8887	PCI, 64 simultaneous voices, Ensoniq ES1370 chipset	4Hz-48kHz	>90dB	Jul-98
E Monster Sound M80	\$249	Chips and Bits, Ph: 03 9696 1911	PCI, 32 simultaneous voices, Diamond Freedom 5600 chipset	400Hz-48kHz	>90dB	Jul-98
Monster Sound MX200	\$349	Chips and Bits, Ph: 03 9696 1911	PCI, 64 simultaneous voices, Diamond Freedom 5600 chipset	400Hz-48kHz	>90dB	Jul-98
Diamond Sonic Impact	\$149	Chips and Bits, Ph: 03 9696 1911	PCI, 64 simultaneous voices, ESS Maestro-2 chipset	400Hz-48kHz	>90dB	Jul-98
Videologic Sonic Storm	\$159	Syslink, Ph: 1800 067 722	PCI, 64 simultaneous voices, ESS Maestro-1 chipset	8Hz-48kHz	85dB	Jul-98
Yamaha Waveforce	\$179	Peripheral Sources International, Ph: 03 9878 8611	PCI, 64 simultaneous voices, Yamaha XGYM724C-V chipset	5Hz-48kHz	80dB	Jul-98

PC SPEAKERS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	REVIEWED
4Q Sound Image Jr	\$144	Powersource Australia, Ph: 02 9748 8600	10 watts/channel	Feb-98
E Altec Lansing ACS48	\$299	Innovision, Ph: 03 5831 8833	20 watts/channel	Feb-98
Altec Lansing ACS45	\$199	Innovision, Ph: 03 5831 8833	10 watts/channel	Feb-98
Bose MediaMate	\$799	Bose Australia, Ph: 02 9204 6111		Feb-98
Boston Acoustics MicroMedia	\$499	Hi Fi & Video Marketing, Ph: 02 9319 6877		Feb-98
E Cambridge Soundworks	\$499	Creative Pacific, Ph: 02 9906 8887		Feb-98
Cambridge PCWorks	\$249	Creative Pacific, Ph: 02 9906 8887		Feb-98
Labtec LCS-1022	\$99	Westan, Ph: 03 9563 6775	2.5 watts/channel	Feb-98

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CD-ROM WRITERS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	WINBENCH CD-ROM WinMARK 98	COPY (TIME)	REVIEWED
HP SureStore CD-Writer Plus 7100e	\$979	Hewlett-Packard, Ph: 13 13 47	Parallel interface, 2.5MB/sec transfer rate	274.0	24:37:03	Feb-98
E Normai 680.RW	\$1099	Tech-Excel, Ph: 02 9417 7898	SCSI-2 interface, 5MB/sec transfer rate	365.0	20:00:00	Feb-98
Ricoh MP6200S	\$1095	NRG, Ph: 9938 0800	SCSI-2 interface, 5MB/sec transfer rate	546.0	12:00:00	Feb-98
M Yamaha CDR401T	\$962	Synnex, Ph: 03 9540 0555	EIDE interface, 5.5MB/sec transfer rate	527.0	11:55:00	Feb-98
Yamaha CRW4001T	\$1348	Synnex, Ph: 03 9540 0555	EIDE interface, 2MB/sec transfer rate	479.0	17:08:01	Feb-98

AGP MOTHERBOARDS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	WINSTONE 98	CPUMARK32	REVIEWED
Abit AB-LX6	\$320	Synnex, Ph: 03 9540 0555	Slot 1, Intel 440LX, Max. RAM: 512MB SDRAM/1GB EDO	22.9	821	Apr-98
AME P6AXA	\$268	AME Group, Ph: 02 9749 9788	Slot 1, Intel 440LX, Max. RAM: 512MB SDRAM/EDO	22.9	830	Apr-98
EPOX KP6-LA	\$180	Zeus Technology, Ph: 08 9321 6969; Hi-Tech, Ph: 03 9574 9166	Slot 1, Intel 440LX, Max. RAM: 512MB SDRAM/1GB EDO	22.5	802	Apr-98
FIC PA-2012	\$250	FIC, Ph: 02 9748 4566	Socket 7, Via Apollo VP3, Max. RAM: 256MB SDRAM/EDO	16.3	449	Apr-98
FIC VA-503	\$215	FIC, Ph: 02 9748 4566	Socket 7, Via Apollo VP3, Max. RAM: 512MB SDRAM/EDO	13.8	385	Apr-98
Intel 440LX	\$315	Intel, Ph: 03 9540 0555	Slot 1, Intel 440LX, Max. RAM: 384MB SDRAM	21.4	803	Apr-98
E Lucky Star 6ALX2	\$238	Times International, Ph: 03 9696 8244	Slot 1, Intel 440LX, Max. RAM: 384MB SDRAM/768MB EDO	23.7	919	Apr-98
E MS5169	\$229	Mystar, Ph: 02 9868 6962	Socket 7, Aladdin 5, Max. RAM: 384MB SDRAM/768MB EDO	16.3	405	Apr-98
MS6117	\$290	Mystar, Ph: 02 9868 6962	Slot 1, Intel 440LX, Max. RAM: 384MB SDRAM/768MB EDO	21.7	821	Apr-98
Stallion M668	\$995	MBI, Ph: 02 9773 0055	Slot 1, Intel 440LX, Max. RAM: 512MB SDRAM/1GB EDO	22.4	815	Apr-98
Legend P6I440LX	\$330	QDI, Ph: 03 9558 9280; Spear Technology, Ph: 03 9558 9431	Slot 1, Intel 440LX, Max. RAM: 512MB SDRAM/1GB EDO	22.6	817	Apr-98
SuperMicro P6DLS	\$729	BCN Technology, Ph: 02 9417 3688	Slot 1, Intel 440LX, Max. RAM: 512MB SDRAM/1GB EDO	22.2	797	Apr-98
SuperMicro SLA	\$302	BCN Technology, Ph: 02 9417 3688	Slot 1, Intel 440LX, Max. RAM: 512MB SDRAM/1GB EDO	22.2	806	Apr-98

BX MOTHERBOARDS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	WINSTONE BUSINESS BROWSERS	CPUMARK32	REVIEWED
Abit AB-BX6	\$339	Synnex, Ph: 03 9540 0555	66/75/83.3/100/103/112/133.3	4.04	1010	Sep-98
Aopen AX6B	\$299	Servex, Ph: 02 9870 4868	66/68.5/75/83.3/100/103/112/133.3	3.95	980	Sep-98
Asus P2B-LS	\$630	Tech-Excel, Ph: 02 9417 7898	50/66.8/75/83.3/100/103/112	4.04	994	Sep-98
Chaintech 6BTM	\$275	Adelong, Ph: 1800 626 345	66/100	3.89	992	Sep-98
EPoX EP-61BXA-M	\$249	Westan, Ph: 03 9463 6775	66/100	3.94	1020	Sep-98
Gigabyte GA-686BX	~~\$269~~ \$295	BBF, Ph: 03 9761 4299; Global Business, Ph: 02 9644 3900	66/100	3.99	1030	Sep-98
E Iwill BD100	\$290	COM1 International, Ph: 03 9532 4717	66/75/83/100/112/133.3	4.12	1000	Sep-98
Iwill BS100	\$535	COM1 International, Ph: 03 9532 4717	66/75/83/100/112/133.3	4.07	1040	Sep-98
Lucky Star 5ABX2V	\$269	Times International, Ph: 03 9696 8244	66.6/75/83/100/103/112/133.3	4.05	1020	Sep-98

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M6TBC	\$350	Edge, Ph: 02 9353 9200	66/100	4.02	1030	Sep-98
MSI MS-6116	\$315	MSI, Ph: 02 9476 3117	66/68.5/75/83.3/100/103/112	4.11	996	Sep-98
MSI MS-6119	\$305	MSI, Ph: 02 9476 3117	66/68.5/75/83.3/100/103/112	4.04	1040	Sep-98
PC Partner BXA808D	\$254	BCN Technology, Ph: 02 9417 3688	66/100	3.91	1020	Sep-98
P61440BX Brilliant 1	\$268	ODI, Ph: 03 9558 9280	66/100	3.90	980	Sep-98
Supermicro Super P6SBA	\$327	BCN Technology, Ph: 02 9417 3688	66/100	4.06	999	Sep-98
Supermicro Super P6SBS	\$605	Tech-Excel, Ph: 02 9417 7898	66/100	4.03	1020	Sep-98
SuperPower SP-P11 BXA	\$280	MoMo Technology, Ph: 07 3376 9631	66/100	3.96	979	Sep-98
Tekram P6B40-A4X	\$299	Lan1, Ph: 1300 301 053	66/100	3.96	994	Sep-98
Tyan Tsunami S1846S	\$389	Chips and Bits, Ph: 03 9696 1911; IPS, Ph: 02 9923 1777	66/100	3.96	995	Sep-98
Umax UMB-440BX	\$319	PSI, Ph: 03 9510 9040	66/100	3.92	989	Sep-98

SERVERS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	SERVERBENCH PROCESSOR MIX (32 CLIENTS)	REVIEWED
AcerAltos 9100	\$12,110	Acer Computer, Ph: 02 9870 1999	P11 266MHz, 128MB EDO RAM, 4.3GB HD	15.6	Jun-98
DeltaCom P11 Server	\$10,990	Alfa Computers, Ph: 02 9317 3344	P11 266MHz, 128MB SDRAM, 4.5GB HD	16.0	Jun-98
Digital Server 3000	\$11,460	Digital, Ph: 02 9561 7428	P11 266MHz, 128MB EDO RAM, 2 x 4.5GB HD	15.4	May-98
Evolution Ultra Pro	\$9995	Compu Centre, Ph: 03 9642 5999	P11 266MHz, 128MB SDRAM, 2 x 4.5GB HD	16.4	May-98
E Express 5800/130A Pro	\$12,674	NEC, Ph: 13 16 32	Pentium Pro 200MHz, 128MB EDO RAM, 4.2GB HD	15.0	Jun-98
E HP LC II	\$8200	Hewlett-Packard, Ph: 13 13 47	P11 266MHz, 128MB ECC RAM, 4.26GB HD	15.1	May-98
Power Pro Server	\$10,990	Microarts, Ph: 03 9696 5955	P11 266MHz, 128MB SDRAM, 4.5GB HD	16.4	Jun-98
Ultra P11 BX Server	\$5520	Beyond Computers, Ph: 02 9417 3688	P11 266MHz, 128MB SDRAM, 4.2GB HD	17.0	Jun-98

CLUSTERED SERVERS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	FAILOVER TIME (SECONDS)	REVIEWED
Data General AVioN NT	\$127,000	Data General, Ph: 03 9698 6988	4 x Pentium Pro 200MHz, 10 x 4GB disk array	27	Jun-98
Dell PowerEdge Cluster	\$74,176	Dell, Ph: 1800 808 312	2 x Pentium Pro 200MHz, 8 x 4GB disk array	25	Jun-98
Digital Server 3200 and RAID Array 310	\$35,373	Digital, Ph: 02 9561 5252	2 x Pentium II 266MHz, 7 x 2.1GB disk array	28	Jun-98
HP NetServer LH11 and AutoRAID	\$128,100	Hewlett-Packard, Ph: 13 13 47	2 x Pentium II 300MHz, 7 x 9.1GB + 10 x 4GB disk array	24	Jun-98

SMALL OFFICE NETWORKING

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	REVIEWED
Cisco Networked Office Stack	various	Cisco, Ph: 02 9935 4100	Hubs, switches, routers and peripherals	Jul-98
D-Link Office	various	D-Link, Ph: 02 9417 7100	Hubs, switches, routers and peripherals	Jul-98
Intel InBusiness	various	Intel, Ph: 02 9937 5800	Hubs, switches, routers and peripherals	Jul-98
E NetGear	various	Bay Networks, Ph: 02 9927 8888	Hubs, switches, routers and peripherals	Jul-98
3Com OfficeConnect	various	3Com, Ph: 02 9956 6247	Hubs, switches, routers and peripherals	Jul-98



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For comparison, listed prices are from time of testing.

NETWORKING KITS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	REVIEWED
3Com OfficeConnect	\$310	3Com, Ph: 02 9956 6247	10Mbps Ethernet, ISA, 2 computers supported in kit (max. 4)	Oct-98
D-Link DE-905	\$228	D-Link Australia, Ph: 02 9417 7100	10Mbps Ethernet, ISA, 2 computers supported in kit (max. 5)	Oct-98
NDC SOHOware	\$199	Intresource, Ph: 02 9807 6999	10Mbps Ethernet, PCI, 2 computers supported in kit (max. 5)	Oct-98
NDC SOHOware Fast	\$249	Intresource, Ph: 02 9807 6999	100Mbps Ethernet, PCI, 2 computers supported in kit (max. 5)	Oct-98
E NetGear SB 104	\$249	Bay Networks, Ph: 02 9927 8888	10Mbps Ethernet, PCI, 2 computers supported in kit (max. 4)	Oct-98
Radio Lan/10	\$960	OMNIconnect, Ph: 03 9787 0122	10Mbps radio frequency, ISA, 2 computers supported in kit (max. 128)	Oct-98
WebGear Aviator Wireless	\$630	MIMP, Ph: 08 8297 2088	150Kbps radio frequency, Parallel, 2 computers supported in kit (max. 32)	Oct-98

WEB SERVER APPLIANCES

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	REVIEWED
Micro Webserver 200	\$2006	Cisco, Ph: 02 9935 4100	IBM PowerPC 403GA, 2.1GB HD, Vxworks OS	Sep-98
E Cobalt Qube2699	\$2699	Lidcam, Ph: 03 9820 9077	MIPS 5230R, 2.1GB HD, Linux 2.0.27	Sep-98
Microtest Webserver	\$3760	SCSI Corp., Ph: 02 9894 6033	AMD 5x86, 2.1GB HD, Linux 2.0.27	Sep-98

PRINT SERVERS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	PRINT TEST (SEC)	REVIEWED
Axis PrintPoint 560/100	\$810	Intelligent Technologies, Ph: 02 9891 6611	Ports: 2 parallel, 1 serial, 10/100Mbps auto-sensing	88.0	Mar-98
D-Link DP-300	\$695	D-Link, Ph: 02 9417 7100	Ports: 2 parallel, 1 serial, 10/100Mbps auto-sensing	93.0	Mar-98
Emulex NETQue PRO2	\$917	XSI Technology, Ph: 02 9879 7211	Ports: 2 parallel, 1 serial, 10Mbps	99.0	Mar-98
JetDirect EX Plus3	\$968	Hewlett-Packard, Ph: 13 13 47	Ports: 3 parallel, 10Mbps	83.0	Mar-98
E NetPortExpress PRO/100	\$877	Intel, Ph: 02 9937 5800	Ports: 2 parallel, 1 serial, 10/100Mbps auto-sensing	96.0	Mar-98
MarkNet Pro 3	\$706	Lexmark, Ph: 1800 674 484	Ports: 2 parallel, 1 serial, 10/100Mbps auto-sensing	91.0	Mar-98
DPI NETPrint 1000	\$1639	Digital Networks Australia, Ph: 02 9437 5177	Ports: 2 parallel, 1 serial, 10Mbps	87.0	Mar-98

PERSONAL ISDN ROUTERS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	TWO-CLIENT COMBINED FTP COPY	REVIEWED
ACC Congo Router	\$1100	XSI Technology, Ph: 02 9879 7211	Up to 4 users	119.5	Jul-98
Ascend Pipeline 75	\$1656	Ascend Communications, Ph: 03 9656 7000	Unlimited users	117.5	Jul-98
Bay Networks Nautica 200	\$1400	Bay Networks, Ph: 02 9927 8888	Unlimited users	120.0	Jul-98
Cisco 766M-G2	\$1989	Cisco, Ph: 02 9935 4100	Up to 4 users	122.6	Jul-98
M Shiva Access Port 2.0	\$2000	Shiva, Ph: 02 9959 2296	Up to 16 users	115.4	Jul-98
WebRamp Entre	\$1490	Anabelle Bits, Ph: 02 9384 8000	Up to 253 users	119.4	Jul-98
ZyXel Prestige 100	\$750	KNX Asia Pacific, Ph: 03 9629 3800	Unlimited users	119.7	Jul-98
ZyXel Prestige 128	\$880	KNX Asia Pacific, Ph: 03 9629 3800	Unlimited users	118.9	Jul-98

FAST ETHERNET HUBS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	REPEATER	REVIEWED
BayStack 202	\$3474	Bay Networks, Ph: 02 9927 8888	100Mbps, 12 ports. Max. managed: 8 hubs, 96 ports	Class I	Apr-98
Netelligent 3612	\$4610	Compaq, Ph: 1300 368 369	100Mbps, 12 ports. Max. managed: 5 hubs, 60 ports	Class I	Apr-98
AdvanceStack 12TXM	\$4333	Hewlett-Packard, Ph: 13 13 471	100Mbps, 12 ports. Max. managed: 5 hubs, 60 ports	Class I	Apr-98
E Intel Express	\$2198	Intel, Ph: 02 9937 5800	10/100Mbps, 12 ports. Max. managed: 8 hubs, 96 ports	Class I	Apr-98

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SMC TigerStack 100 5312TX	\$2374	Harris Technology, Ph: 02 9957 1142	100Mbps, 12 ports. Max. managed: 8 hubs, 96 ports	Class I	Apr-98
3Com SuperStack II	\$1856	3Com, Ph: 02 9956 6247	100Mbps, 12 ports. Max. managed: 7 hubs, 91 ports	Class II	Apr-98

AUTO-SENSING SWITCHES

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	SWITCH BROADCAST LATENCY (MS, 640BYTE FRAME)(1518BYTE FRAME)	REVIEWED
Accton Fast SwitchHub-8mi	\$3074	Anabelle Bits, Ph: 02 9384 8000	Managed, Accton chip set	14 130	Aug-98
Allied Telesyn CentreCOM AT-FS708	\$3311	Express Data, Ph: 02 9598 9100	Unmanaged, Galileo chip set	22 188	Aug-98
Asante FriendlyNET FS4008DS	\$1299	Conexus, Ph: 02 9975 2799	Unmanaged, Galileo chip set	17 188	Aug-98
Cisco 1548 MicroSwitch	\$3440	Cisco, Ph: 02 9935 4100	Unmanaged, Galileo chip set	17 188	Aug-98
Cisco Catalyst 2908XL	\$4135	Cisco, Ph: 02 9935 4100	Managed, Cisco chip set	16 132	Aug-98
Compaq Netelligent 5708TX	\$3288	Compaq, Ph: 1300 368 369	Managed, Accton chip set	14 130	Aug-98
D-Link DES-1008	\$2206	D-Link, Ph: 02 9417 1077	Unmanaged, Galileo chip set	17 188	Aug-98
D-Link DES-3208	\$3834	D-Link, Ph: 02 9417 1077	Managed, Galileo chip set	21 263	Aug-98
Farallon Fast Starlet Switch	\$1580	Lidcam, Ph: 03 9820 9077	Unmanaged, Galileo chip set	17 189	Aug-98
NetGear FS508	\$2099	Bay Networks, Ph: 02 9927 8888	Unmanaged, Accton chip set	14 130	Aug-98
SMC Tigerswitch 6608T	\$3614	SMC, Ph: 02 9929 9150	Managed, Accton chip set	13 130	Aug-98

SOFTWARE

SEARCH INDEXES AND DIRECTORIES

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	PORTAL FEATURES	REVIEWED
Alta Vista	N/A	www.altavista.yellowpages.com.au	Local Australian site available	■	Jan-98
Answers	N/A	www.answers.com.au	Local Australian site only	■	Jan-98
Excite	N/A	au.excite.com	Local Australian site available	■	Jan-98
E Hotbot	N/A	www.hotbot.com		■	Jan-98
Infoseek	N/A	www.infoseek.com		■	Jan-98
LookSmart	N/A	www.looksmart.com.au	Local Australian site available	■	Jan-98
Lycos	N/A	www.lycos.com		■	Jan-98
Northern Light	N/A	www.nlsearch.com		■	Jan-98
Open Text Index	N/A	www.opentext.net		■	Jan-98
PlanetSearch	N/A	www.planetsearch.com		■	Jan-98
Search.com	N/A	www.search.com		■	Jan-98
WebCrawler	N/A	www.webcrawler.com		■	Jan-98
WebWombat	N/A	www.webwombat.com.au	Local Australian site only	■	Jan-98
E Yahoo!	N/A	www.yahoo.com.au	Local Australian site available	■	Jan-98

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OCR SOFTWARE

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	WORD ACCURACY	AVG SEC/PAGE	REVIEWED
Caere OmniPage Pro 8.0	\$899	Performance Sales, Ph: 02 9450 0777	Requires: 486-based PC or better, 16MB RAM, 33MB disk space	97.6%	19.2	Mar-98
Presto! OCR Pro 3.0	\$199	Impex Trading, Fax: 0011 64 9420 7466	Requires: 486-based PC or better, 8MB RAM, 25MB disk space	98.7%	23.5	Mar-98
Recognita	\$986	Digital Colour Publishing, Ph: 07 3344 7244	Requires: 386-based PC or better, 8MB RAM, 15MB disk space	97.2%	13.0	Mar-98
E TextBridge Pro 98	\$200	Fuji Xerox, Ph: 13 14 11	Requires: 486-based PC or better, 16MB RAM, 25MB disk space	98.8%	20.6	Mar-98
TypeReader Professional 4.0 Workstation	\$695	Proscan, Ph: 02 9904 1244	Requires: 386-based PC or better, 8MB RAM, 20MB disk space	98.1%	7.8	Mar-98

TROUBLESHOOTING UTILITIES

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	REVIEWED
CheckIt version 5	\$80	Marketing Results, Ph: 02 9899 5888	Good reporting, good diagnostics	May-98
E First Aid 98	\$70	Cybermedia, Ph: 1800 621 399	Fair diagnostics, good tune-up, excellent troubleshooting	May-98
Norton CrashGuard Deluxe	\$79	Symantec, Ph: 02 9850 1000	Fair tune-up, good troubleshooting	May-98
Norton Utilities 3.0	\$129	Symantec, Ph: 02 9850 1000	Fair reporting, fair diagnostics, excellent tune-up, good troubleshooting	May-98
E Nuts & Bolts	\$100	Network Associates, Ph: 02 9437 5866	Fair reporting, fair diagnostics, excellent tune-up, good troubleshooting	May-98
PC Care 97	\$89	Techstar, Ph: 07 3367 1444	Poor reporting, excellent diagnostics	May-98
RealHelp Extra Strength	\$100	Quarterdeck, Ph: 02 9545 4072	Fair reporting, fair diagnostics, good tune-up, good troubleshooting	May-98

UNINSTALLERS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	AVERAGE SECONDS BEFORE INSTALL	REVIEWED
E CleanSweep Deluxe	\$90	Quarterdeck, Ph: 02 9545 4072	Prompts to remove backup files, removes browser-related files	2.7	May-98
Norton Uninstall Deluxe	\$59	Symantec, Ph: 02 9850 1000	Creates self-installing files, removes browser-related files	16.4	May-98
Remove-It	\$60	Quarterdeck, Ph: 02 9545 4072	Prompts to remove backup files, fully edits INI files	9.9	May-98
Uninstaller 4.5	\$70	Cybermedia, Ph: 1800 621 399	Removes browser-related files	47.7	May-98
WinDelete 97	\$60	IMSI, Ph: 02 9319 7533	Fully edits INI files	<1.0	May-98

FILE VIEWERS

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	REVIEWED
AutoVue Professional	\$935	CADApps, Ph: 03 9416 2520	Displays columns, browser plug-in	May-98
Drag and View	\$50	Intech, Ph: 02 9540 2374	HTML hyperlinks are live	May-98
KeyView Pro 6.0	\$42	Select Computer, Ph: 02 6241 5633	Converts word processor formats	May-98
E QuickView Plus 4.5	\$99	Inso, Ph: 02 9499 4611	Displays columns, browser plug-in	May-98
TurboBrowser 98	\$99	DP Computing, Ph: 08 8326 4364	Converts word processor formats	May-98

VIRUS SOFTWARE

	PRICE	VENDOR/DISTRIBUTOR	THE SPECS	EXECUTABLE VIRUSES MISSED	EXCEL MACRO VIRUSES MISSED	REVIEWED
Dr Solomon's Anti-Virus	\$99	Network Associates, Ph: 02 9437 5566	Automated updates	16	4	May-98
IBM Anti-Virus	\$49	IBM, Ph: 13 24 26	Schedules automatic scans	13	0	May-98
InocLAN AntiVirus	\$94	Express Data, Ph: 02 9598 9100	Makes backup of master boot record	3	1	May-98
McAfee VirusScan	\$67	Network Associates, Ph: 02 9437 5866	Schedules automatic scans	2	1	May-98
Norton AntiVirus	\$99	Symantec, Ph: 02 9850 1000	Makes backup of master boot record	10	2	May-98
PC-Cillin	\$90	Marketing Results, Ph: 02 9899 5888	Makes backup of master boot record	2	2	May-98
Vet Premium Anti-Virus	\$99	Cybec, Ph: 03 9825 5600	Makes backup of master boot record	14	1	May-98

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Is currently the most comprehensive software system for quality control of processes and systems.

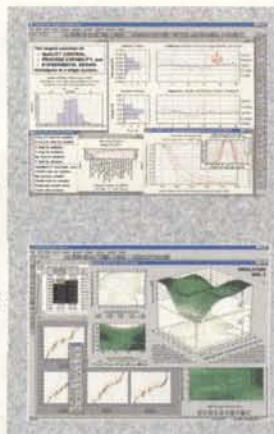


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Leprechaun Virus Buster	\$80	Leprechaun Software, Ph: 07 3823 1300	20	3	May-98
VirusSweep	\$70	Quarterdeck, Ph: 02 9545 4072	5	2	May-98

NETWORK BACKUP SOFTWARE

PRICE	VENDOR/DISTRIBUTOR	THE SPECS	BACKUP (MIN:SEC)	RESTORE (MIN:SEC)	REVIEWED
ARCserve 6.1 for Netware	\$2633—Computer Associates, Ph: 02 9937 0500	Unattended backup/restore, backs up open files	33:16	3:12	May-98
ARCserve 6.1 for Windows NT	\$1942—Computer Associates, Ph: 02 9937 0500	Unattended backup/restore, backs up open files	35:36	3:46	May-98
Replica 3 for Netware	\$3633—Dawn Technologies, Ph: 02 9417 3822	Unattended backup, backs up open files	25:12	10:25	May-98
Replica 3 for Windows NT	\$3633—Dawn Technologies, Ph: 02 9417 3822	Unattended backup, backs up open files	29:26	10:12	May-98
E Seagate Backup Exec for Netware	\$2050—Aeronaut Industries, Ph: 02 9436 1175	Unattended backup/restore	29:18	2:48	May-98
E Seagate Backup Exec for Windows NT	\$2,050—Aeronaut Industries, Ph: 02 9436 1175	Unattended backup/restore	32:13	3:02	May-98

JAVA DEVELOPMENT PACKAGES

PRICE	VENDOR/DISTRIBUTOR	THE SPECS	OUTPUT FILE SIZES OF A SAMPLE JAVA APP	REVIEWED
CodeWarrior Professional 2.0	\$699—Techflow, Ph: 1800 021 100	Provides classes for database connectivity	35,152	Jun-98
JBuilder Client/Server Suite	\$2599—Inprise, Ph: 02 9248 0900	Provides classes for database connectivity, class browser	41,689	Jun-98
Sun Java Workshop 2.0	\$230—Sun Microsystems, Ph: 02 9844 5000	Remappable keys/macros	40,403	Jun-98
Sybase PowerJ Enterprise 2.1	\$3095—Sybase, Ph: 02 9936 8800	Supports ActiveX	34,477	Jun-98
VisualAge for Java 1.0	\$4145—IBM, Ph: 13 24 26	Visual class designer tool	34,501	Jun-98
Visual Café 2.1	\$699—Symantec, Ph: 02 9850 1000	Remappable keys/macros	41,689	Jun-98

PROJECT MANAGEMENT SOFTWARE

PRICE	VENDOR/DISTRIBUTOR	THE SPECS	OPEN/SAVE LARGE FILE (SEC)/CONSOLIDATE MULT. PROJ.	REVIEWED
CA-SuperProject 4.0	\$995—Microchannel, Ph: 02 9906 3666	64,000 tasks per project, 16,000 projects	3.2—10.8	Aug-98
E Microsoft Project 98	\$779—Microsoft, Ph: 02 9870 2200	Unlimited tasks per project, 1000 projects	15.7—47.2	Aug-98
Project Scheduler 7	\$1095—Bowten, Ph: 02 4822 4708	99,999 tasks per project, unlimited projects	6.7—7.4	Aug-98
SureTrak Project Manager 2.0	\$795—P3 Software, Ph: 03 9888 4433	10,000 tasks per project, 1000 projects	40.0—63.3	Aug-98
Time Line 6.5	\$790—Connect Direct, Ph: 02 6643 3215	32,000 tasks per project, unlimited projects	30.4—89.1	Aug-98
TurboProject Professional 2.0	\$600—IMSI, Ph: 02 9319 7533	Unlimited tasks per project, unlimited projects	2.8—9.7	Aug-98

HOME REMODELLING SOFTWARE

PRICE	VENDOR/DISTRIBUTOR	THE SPECS	REVIEWED
Sierra Complete Home Suite	\$89.95—Dataflow, Ph: 02 9417 9700	Brilliant for basic layouts and remodelling information	Oct-98
E 3D Home Architect	\$99.95—Dataflow, Ph: 02 9417 9700	Extensive library of more than 100,000 objects	Oct-98
IMSI FloorPlan 3D Deluxe	\$69.95—IMSI, Ph: 02 9319 7533	FloorPlan 3D, TurboCad 3D, Garden Designer, Quick & Easy Estimator and Home Styles	Oct-98
AutoDesk Planix Home Designer	\$50—Recon Software, Ph: 02 9562 7911	Best suited for users familiar with CAD-like tools	Oct-98

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Net Tools



Server NICs with Tricks

Packed with features that use multiple ports and increase fault tolerance, these NICs go a long way in optimising your LAN.

By Les Freed

The Network Interface Card (NIC) is one of the least expensive and most overlooked server components. But it's also one of the most important. Because every bit of data travelling to or from a server must pass through the NIC, the failure of a \$150 card can bring a \$30,000 server to its knees.

Until recently, many NIC vendors offered a single product line for both client and server PCs. Now, a new breed of NICs designed specifically for server duty provides increased reliability and better overall performance on your LAN, with only a minimal investment in hardware.

For this story, we asked for PCI-based 10/100-Mbps server NICs that run on both Windows NT and NetWare networks. We accepted single port cards but requested multiport versions whenever possible. We netted eight NICs from five vendors, with Adaptec, Intel and Matrox each supplying two cards.

The cards we tested include single-port, dual-port, and quad-port models—with two NICs designed with on-board processors (from Intel and Matrox). Prices range from \$169 for the single-port Adaptec model to \$1998 for the four-port Matrox 100 Multiport NIC+.

INSIDE

FROM THE NIC UP:

Looking for ways to break the bottleneck? Consider upgrading your server NICs. Contributing editor Les Freed and ZD Labs' Martin Wong test eight cards that pack plenty of features for improving reliability and speeding up performance.



HYDRA REARS ITS HEADS:

Long known by the catchy code name Hydra, the Microsoft NT Terminal Server is here—letting you deploy server-centric distributed computing on Microsoft platforms. Contributor David Chernicoff tests it along with Citrix MetaFrame, which extends Hydra's capabilities. *Page 154.*

MANAGEMENT MADE EASIER?

Platinum Technologies' ProVision Network Monitor aims to take some of the burden off managing your network. Find out whether contributor Greg Alwang thinks it delivers on its promises. *Page 155.*



HANGING YOUR E-SHINGLE:

Setting up an e-commerce site gets easier. Contributor John Garris checks out new versions of Lotus Domino Merchant 2.0 and Microsoft Site Server Commerce Edition. *Page 156.*

Our testing proved that higher-priced, multiport NICs don't necessarily buy you faster speeds per port. Although our tests showed that expensive on-board processors did speed performance in some instances, some of the lowest-cost, single-port products we tested—the Adaptec ANA-69011 Single32 Fast Ethernet NIC (\$169), the Intel PRO/100+ Server Adaptor (\$258), and the 3Com Fast EtherLink Server NIC (\$243)—were the fastest performers. But the two dual-port NICs from Adaptec and Compaq are also worthy and save you a server slot.

Beyond design, look for NICs that demonstrate the best balance of high throughput and low CPU utilisation. Moreover, you'll also want to take into account your network operating system. For details, turn to "Where Did My CPU Go?"

SMART NIC TRICKS

To reap some of the benefits of server NICs, you need more than one port. Implementing multiple NICs lets you take advantage of software-based fault-tolerance, asymmetric port aggregation, and symmetric port aggregation capabilities.

Fault tolerance protects the server's LAN link by using redundant NICs. If one NIC fails, the fail-over software deactivates the faulty NIC and switches LAN traffic to an alternate card. The rerouting takes place almost instantaneously, without human intervention. All the NICs we tested include fail-over capability.

Most of these NICs provide *asymmetric port aggregation* (also referred to as *asymmetric load balancing* or *asymmetric trunking*). This technology distributes outbound server traffic between two or more cards, providing a wider data pipe. The NICs act as a team that appears as a single device with one network address. Asymmetric port aggregation is ideal for Web servers, e-mail servers, and other applications where most of the traffic flows in one direction from the server to the client PCs. This method also provides fault tolerance; if one of the NICs in a team fails, the others compensate.

A companion technology is *symmetric port aggregation* (or *symmetric load balancing* or *symmetric trunking*). This method combines two or more connections into a wider pipe that can transmit data in both directions. Combining several 100Mbps connections lets you obtain claimed Gigabit Ethernet speeds

Server NIC Technologies

FAULT TOLERANCE

To increase reliability, the server communicates with the LAN via a primary NIC. If the link fails, the fault-tolerant NIC driver running on the server automatically reroutes traffic to the secondary NIC.



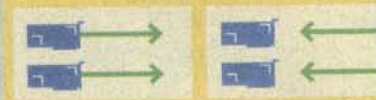
ASYMMETRIC PORT AGGREGATION

This capability evenly distributes outbound LAN traffic among multiple NICs. The NICs are connected to the same switch and appear to the switch as one device. Inbound traffic, however, passes through a single NIC.



SYMMETRIC PORT AGGREGATION

This method combines the bandwidth of multiple NICs for both incoming and outgoing traffic, for a single full-duplex link of up to 800 Mbps. The NICs must connect to a switch that supports this technology.



without replacing hubs or switches. And it, too, provides fault tolerance.

The Intel and Compaq cards are the only NICs here to offer this capability. Symmetric port aggregation requires a specific vendor's Ethernet switch. These NICs operate with Cisco's Fast EtherChannel technology—but only in conjunction with a Cisco Ethernet switch. The single-port Adaptec and the 3Com NICs will add this feature by year's end.

In addition, two NICs (the Intel PRO/100 Intelligent Server Adaptor and the 3Com Fast Etherlink Server NIC) provide Virtual LAN (VLAN) capability. This IP-based technology lets a single server link (one NIC or a team of NICs) carry traffic for up to 64 logical subgroups created via software. It provides additional bandwidth management and security features and helps reduce the administrative overhead required to manage workstation moves and changes. As with both types of bandwidth aggregation, VLAN technology lacks an industry-wide standard, so any VLAN NICs you use must be compatible with your VLAN switches.

UNEXPECTED FEATURES

Many of the products we tested include significant features we haven't seen before. Three cards—the Compaq product and the two units from Intel—are Hot Plug-capable, which means that when used with a Hot Plug-compatible server (currently available

EDITORS' CHOICE

Intel PRO/100+ Server Adaptor



These eight server-specific single and multiport network adaptors provide an array of innovative features that improve manageability, reliability, and

performance. Though nearly every product we tested brings something new to the table, the single-port Intel PRO/100+ Server Adaptor (\$258) stands above the rest, with impressive features and performance at a bargain price.

The PRO/100+'s feature set provides a laundry list of the capabilities in this emerging category of NICs. It boasts fault tolerance and asymmetric port aggregation. And it was one of only three cards to work with Intel's Fast EtherChannel, gaining symmetric port aggregation as well. In addition, it was just one of three cards to feature Compaq's Hot Plug technology, which lets administrators switch components without powering down the server. The PRO/100+ also has the most extensive set of drivers that we saw, so you can use it with almost any operating system your server is running.

But for server NICs, features mean nothing without performance to back them up. The Pro/100+ demonstrated outstanding speeds, turning in the highest average throughput in segmented networks under both NetWare and Windows NT, and above-average throughput on flat networks. Even without an on-board processor, the card showed consistently low CPU utilisation, especially under NetWare.

And good performance doesn't mean much if you don't have the management capabilities to keep the card running. The PRO/100+ is one of the only cards to have dynamic code loading, which lets the host server automatically download firmware onto the NIC to optimise performance. In addition to being DMI 2.0-compliant, the Pro/100+ is certified under Intel's Wired For Management 1.1 specification and includes SNMP agents to make integration with your software as easy as possible.

MicroGram Computers

Internal UPS & Power Supply



It's not just a UPS but also a 300W power supply. The UPS is actually built into a standard size power supply and the batteries and front

panel occupy a 5.25in drive bay. The UPS is rated at 500VA. Apart from power failure, the UPS also protects against over voltage, under voltage, overload & DC short circuit. The unit is available in two sizes - PS/2 or ATX. Optional software provides for automatic shutdown.

Cat. No. 8498	UPS / PS (PS/2) Int 500VA/300W	\$499
Cat. No. 8588	UPS / PS (ATX) Int 500VA/300W	\$439
Cat. No. 8499	UPS / PS Internal RUPS S'ware	\$99

Compact Keyboard

When desk space is at a premium an 80 key keyboard with full 101 key functionality will come in handy. It has dimensions of only 297(W) x 152(L) x 30(D) mm.



Cat. No. 8238	Compact 81 Key	\$69
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Infra Red Keyboard



This infra red compact keyboard features 86 keys with Win 95 104 key functionality. It features membrane keyswitch with tactile feedback, an effective operating angle of 360 degrees over a distance of 7 metres and low power consumption with high efficiency power management for long life operation. Two buttons at the upper left serve as clicking devices. The infra red receiver has a 6-pin PS/2 mouse connector and standard 5-pin keyboard connector.

Cat. 8655	Keyboard IR Cordless	\$149
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PCMCIA Bar Code Wand

The Bar Code Wand lets you use your handheld PC to collect bar code data directly into any Windows CE application. When you move the wand across a bar code, Windows CE programs behave as though you typed the data in, eliminating the need for special programming. You can replace expensive, dedicated data collection terminals with your H/PC and perform an unlimited variety of computational tasks right at the point of data capture.



Cat. 8672	PCMCIA Bar Code Wand	\$1015
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Cat. 11516	Enhanced Network Cable Tester	\$129
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Year 2000 BIOS Card

Even Pentium motherboards are not immune to the Year 2000 bug! - so don't leave it till it's too late. The Year 2000 BIOS Card solves the problem of progression from 1999 to 2000 as well as 21st century leap years. It is an 8-bit card which provides year 2000 support for motherboards with a BIOS which only stores the year with two digits. i.e. 97 instead of 1997.



Cat. 3359	Year 2000 BIOS Card	\$129
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Cat. No. 8646	UPS 750VA	\$470
Cat. No. 8574	UPS 1500VA	\$1120
Cat. No. 8591	UPS 2000VA	\$3060

Mouse Tablet

The Mouse Tablet 604 is an extraordinary input device that allows you to choose between an easy-to-use, high resolution, trackball-free mouse or an absolutely precise stylus pen. Both pointing devices are implemented with cutting-edge electromagnetic technology, and have a resolution up to 4064 LPI. The three-button stylus pen provides pinpoint accuracy and writing, drawing & painting abilities. Bundled software includes NetProbe (a built-in Internet direct access utility), PenSurfer and PenGuard.



Cat. 8676	Mouse Tablet	\$159
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Hard Drive Recovery Card



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MAT or DELETE commands or even after virus attacks. Supports DOS, Windows 3.x, Windows 95, OS/2 and Windows NT.

Cat. No. 3374	Hard Drive Recovery Card	\$149
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Cat. 6121	PCMCIA Card Drive for Desktop PC	\$209
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Cat. 6458	PCMCIA Card Drive & FDD	\$399
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only from Compaq), system administrators can hot-swap server NICs without bringing down the server. Both the Intel and 3Com NICs employ a driver with *dynamic-code loading* technology, which lets the NOS driver download firmware onto the NIC that is optimised for the server NOS and protocol in use. This driver software automatically senses an error condition on the NIC and takes the appropriate action, such as automatically resetting itself if the on-board interrupt controller stops responding. All the NICs we tested provide PCI bus mastering, a capability lacking in many client NICs. This lets the NIC handle network requests directly, without interrupting the host CPU. Read on to see which server NICs deserve a place in your LAN.

Adaptec ANA-69011 Single32 Fast Ethernet NIC, ANA-6922 Duo 2-Port Fast Ethernet NIC

Single: \$169. Duo: \$735. Annabelle Bits; 02 9384 8000; www.adaptec.com

● The Adaptec NICs we tested are good choices, each with its own bragging rights. The Adaptec ANA-69011 Single32 Fast Ethernet NIC (\$169), the least expensive unit here, demonstrated impressive throughput. But until its new drivers are released, it will lack some competitive fea-

tures, and it had high CPU utilisation under NetWare.

If you're considering a dual-port card, the Adaptec ANA-6922 Duo 2-Port Fast Ethernet NIC (\$735) provides a richer feature set than the Single and above-average performance and low CPU utilisation. Though a bit slower than the Compaq dual-port on most tests, the Duo uses a single interrupt, further preserving server resources.

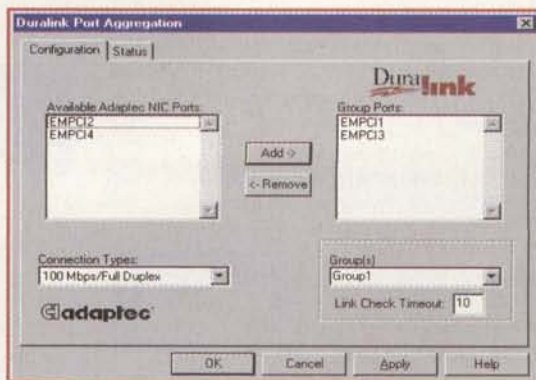
Although Adaptec markets the card primarily as a server NIC, the Single's reasonable price and excellent speed make it a good choice for high-performance desktop machines. However, our tests found its CPU utilisation to be high.

As we prepared this review, Adaptec was working on a major driver update for the Single. The current drivers don't support symmetric port aggregation, PCI Hot Plug or Cisco ISL VLAN, but all of these features should be in place by year's end.

Asymmetric port aggregation features are available for the Duo with the DuraLink Port Aggregation software. The Single turned in fine performance scores, finishing in the top third for throughput across our tests.

The Duo hosts two RJ-45 Ethernet con-

nectors on the rear panel, plus three LEDs for each port. It is essentially two independent NICs on a single card, but unlike the Compaq dual port, they share one PCI interrupt—an important consideration for crowded server PCs. Besides Windows NT



EASY GOING: We found Adaptec's configuration menu among the easiest to navigate, with simple layout and controls.

and NetWare, the Duo includes drivers for SCO UnixWare.

Although not as speedy as its single-port sibling, the Duo turned in respectable performance, as well as low CPU utilisation scores on the segmented network.

Adaptec uses its own DuraLink software

BENCHMARK TESTS

Server NICs

Raw speed is important, but it's not the whole story. How heavy a burden the card puts on a server's CPU is just as important. The best performers demonstrate both high throughput and low CPU utilisation.

NIC vendors continue to seek ways to alleviate network bottlenecks. In the past, when your network failed to move data to the server quickly enough, you had only two remedies: break your network into smaller segments by installing additional server NICs, or migrate to a faster technology. Both methods are costly, in new equipment and time spent reconfiguring the LAN. Asymmetric and symmetric port aggregation technologies present a compelling alternative by letting you combine NIC ports, thereby creating a wider pipe that lets more data pass through quickly.

Our testing shows results from four separate configurations: **Segmented Networks** and **Flat Networks** under NetWare and Windows NT. The Segmented Network's configuration represents a network using traditional segmentation, which divides the LAN into

multiple wiring segments. A Flat Network configuration lets you maintain a single segment, using asymmetric port aggregation software. On comparing the scores for each, you'll see that in most instances asymmetric port aggregation reduces throughput and can drive up CPU utilisation, though most cases, not significantly. In making a buying decision, you'll need to weigh the cost of labour and equipment that implementing segmentation incurs against the performance loss of using a Flat Network scheme.

To evaluate speed, we considered the **Average Throughput** and **Average Utilisation** for each CPU in our dual-processor server under both IntranetWare 4.11 and Microsoft Windows NT 4.0. Two single-port cards—the Intel PRO/100 Intelligent Server Adaptor and the Intel PRO/100+ Server Adaptor (our Editors' Choice)—produced top speeds, as did the Adaptec ANA-69011 Single32 Fast Ethernet NIC and the Compaq NC3122 Fast Ethernet NIC.

To express throughput and CPU utilisation in a combined score, we calculated the **Performance/Efficiency (P/E) Index**. To derive the number, we divided each NIC's Average Throughput score by the average of the two CPU Average Utilisation scores. Here, too, the Intel PRO/100+ Intelligent produced the top rating under NetWare, whereas the Matrox Multiports performed poorly.

Though the Matrox cards achieved the highest P/E score on our segmented Windows NT tests, the numbers are misleading. The cards' lackluster throughput conserved CPU cycles, thus leading to artificially high scores. The Multiport NIC+ also scored poorly on our flat NetWare tests. Matrox and NSI believed our results were

for failover and for asymmetric port aggregation. Although the DuraLink Failover software is bundled with both models, the DuraLink Port Aggregation software comes only with the Duo. Adaptec's products are backed by a limited lifetime warranty. Free technical support is available during regular business hours.

The Single is a good performer, but to optimise its value, wait for the new drivers. The Duo is a good bet, especially if you're short on server resources. —LF

Compaq NC3122 Fast Ethernet NIC

\$ 520. Compaq Computer; Ph: 02 9911 1999;
www.compaq.com.au

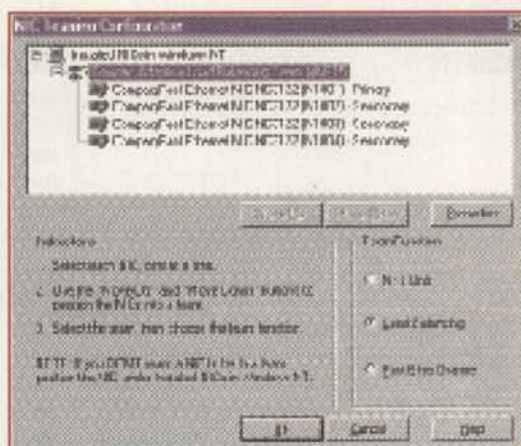
● The only vendor here to manufacture servers and NICs, Compaq Computer takes an integrated approach to network hardware that pays off handsomely. The dual-port Compaq NC3122 Fast Ethernet NIC (\$520) boasts a well-rounded feature set and the overall best performance among multiport NICs. Though it's a good choice for anyone, the product's integration capabilities make it the hands-down choice among Compaq server users.

The NC3122 features two ports with LEDs on each port. In contrast to the Adaptec and

Matrox units, it uses a PCI interrupt for each port just like the single-port NICs do; this trade-off gives you good performance and an available PCI slot. The Compaq provides symmetric port aggregation via Fast EtherChannel. The card's fault tolerance and asymmetric port aggregation worked well, and the vendor plans to release a software upgrade that includes VLAN support by press time. The Compaq card uses an Intel chip set, a by-product of their technology-sharing relationship.

The unit also includes features designed to work exclusively with Compaq servers. Not surprising, the NC3122 is one of only two cards here to work with Compaq's Hot Plug technology, which enables hot-swapping components on equipped servers. SNMP support lets it integrate easily with Compaq's Insight Manager, which comes bundled with the servers, or any other SNMP management software. Moreover, the vendor is developing a universal driver for all its products that will let both client and server-side systems use the same driver.

On our tests, the Compaq unit performed well under both NetWare and Windows NT, finishing near the top for each network operating system on our tests. Under NetWare,



TAG TEAM: Compaq's Teaming option lets you configure the adapters from a single menu.

the Fast Ethernet also demonstrated low, consistent CPU utilisation.

The NC3122 includes a five year return to base warranty and free technical support. If you stick with the Compaq product line, you can avail yourself of unified technical support and a warranty that covers your entire server package.

Compaq server users will love the NC3122's tight integration. But anyone looking for a multiport card is sure to be impressed as well. —Martin Wong

Performance Tests

▲ High scores are best. ▼ Low scores are best.

Bold type denotes first place.

PC denotes Editors' Choice

	Segmented Network				Flat Network			
	Average Throughput (Mbps) ▲	Average Utilisation: CPU 1 ▼	Average Utilisation: CPU 2 ▼	Performance/Efficiency Index ▲	Average Throughput (Mbps) ▲	Average Utilisation: CPU 1 ▼	Average Utilisation: CPU 2 ▼	Performance/Efficiency Index ▲
INTRANETWARE 4.11								
Adaptec ANA-69011 Single32 Fast Ethernet NIC	343.3	82.4%	10.0%	7.43	N/A ²	N/A ²	N/A ²	N/A ²
Adaptec ANA-6922 Duo 2-Port Fast Ethernet NIC	296.9	24.1%	9.0%	17.94	287.4	050.1%	10.0%	9.56
Compaq NC3122 Fast Ethernet NIC	347.7	21.4%	6.0%	22.14	243.5	22.7%	6.0%	16.96
PC Intel PRO/100+ Server Adapter	349.6	15.2%	6.0%	32.98	243.1	23.0%	6.0%	16.76
Intel PRO/100 Intelligent Server Adapter	344.9	8.0%	5.0%	53.01	341.3	7.8%	5.0%	53.42
Matrox 100 Multiport NIC	261.3	57.5%	15.0%	7.21	253.3	43.6%	14.0%	8.80
Matrox 100 Multiport NIC+	118.1	34.9%	N/A ¹	3.38	41.4	30.2%	N/A ¹	1.37
3Com Fast EtherLink Server NIC	349.6	8.1%	5.0%	53.37	N/A ²	N/A ²	N/A ²	N/A ²
MICROSOFT WINDOWS NT SERVER 4.0								
Adaptec ANA-69011 Single32 Fast Ethernet NIC	268.2	98.5%	98.5%	2.72	N/A ²	N/A ²	N/A ²	N/A ²
Adaptec ANA-6922 Duo 2-Port Fast Ethernet NIC	249.4	96.2%	95.5%	2.60	229.6	97.9%	100.0%	2.32
Compaq NC3122 Fast Ethernet NIC	272.9	99.1%	98.9%	2.76	217.3	99.5%	98.4%	2.20
PC Intel PRO/100+ Server Adapter	283.7	98.0%	98.1%	2.89	223.8	99.8%	99.2%	2.25
Intel PRO/100 Intelligent Server Adapter	255.9	99.8%	100.0%	2.56	209.4	99.9%	98.8%	2.11
Matrox 100 Multiport NIC	209.4	100.0%	100.0%	2.09	138.6	89.8%	95.0%	1.50
Matrox 100 Multiport NIC+	188.8	57.4%	57.3%	3.29	115.1	59.0%	50.9%	2.10
3Com Fast EtherLink Server NIC	258.2	99.8%	99.8%	2.59	N/A ²	N/A ²	N/A ²	N/A ²

N/A (1)—Not applicable. The Matrox 100 Multiport NIC+ is not compatible with SMP Novell servers. N/A (2)—Not applicable. This product does not support asymmetric port aggregation.

Differences in CPU utilisation are readily apparent under NetWare. Under Windows NT, however, in most cases both server processors are operating at near maximum capacity. This high utilisation, unfortunately, weakens the value of the P/E Index under Windows NT. (For more information on differences in operating systems, turn to the sidebar "Where Did My CPU Go?")

incorrect and were unable to duplicate the scores in their labs. We worked with them for several days but were unable to solve the problem.

If you're after spectacular performance on a NetWare network and have the server slots to spare, our tests show that four of Intel's PRO/100+ Intelligent Server Adapters (each with its own on-

Intel PRO/100+ Server Adaptor, PRO/100+ Intelligent Server Adaptor

PRO/100+: \$258. PRO/100+ Intelligent: \$866. Intel; Ph: 02 9937 5800; www.intel.com



● Intel's experience in the NIC marketplace shines through with its server-specific offerings. Its two single-port units clearly target different markets, but they each include software that provides a boatload of useful capabilities. The Intel PRO/100+ Server Adaptor (\$258) is geared to the general file-and-print-server market, whereas the Intel PRO/100+ Intelligent Server Adapter (\$866)—which includes an on-board i960 processor—is appropriate for high-volume servers with processor-intensive tasks. Though both provide top-notch performance and rich features, the PRO/100+'s price makes it vault ahead of the pack to win our Editors' Choice.

The PRO/100+ includes the most diverse range of drivers that we saw: NetWare 3.x and 4.1, SCO UnixWare, Sun Solaris, Windows NT Server 3.51 and 4.0 and Windows 95. Intel's technology-sharing relationship with Compaq enables the PRO/100+ to be one of the earliest supporters of Compaq's new Hot Plug PCI technology, which allows you to hot-swap NICs in Hot Plug-compatible servers.

The PRO/100+ Intelligent Server Adapter includes an on-board i960 CPU and 1MB of cache RAM to lessen server CPU utilisation.

Moreover, the PRO/100 is one of two cards here that can operate as part of a virtual LAN (3Com is the other). The PRO/100+ Intelligent can support 64 VLAN connections.

The performance for both cards was outstanding. The PRO/100+ delivered the highest throughput on our segmented network on both NetWare and Windows NT—with above-average throughput on the flat network. The Intelligent Server's CPU helped it achieve the lowest CPU utilisation scores under NetWare and the highest speeds on the NetWare flat network.

Included with both cards, Intel's Adapter Teaming software was easy to install and manage. Aside from fault tolerance, it provides what Intel calls *Adaptive Load Balancing* (asymmetric port aggregation), as well as symmetric port aggregation, using Cisco's Fast EtherChannel (FEC) technology, in conjunction with Cisco switches.

The management capabilities of

these NICs are also extensive. Both are SNMP-manageable, support DMI 2.0, and include dynamic code loading, which lets servers download optimised firmware on their NICs to improve performance. The PRO/100+ is also the only card here that conforms to Intel's Wired for Management 1.1 specification, which is designed to ease management. If you get into trouble, all Intel NICs are backed with a limited lifetime warranty and free technical support.

Both Intel units provide exemplary features and impressive performance. The PRO/100+ comes out ahead, however, by providing them at an unbeatable price.—LF

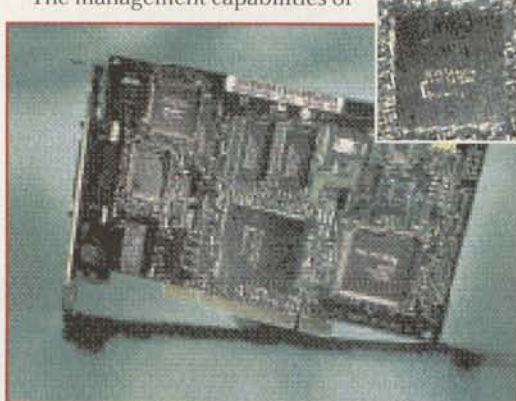
Matrox 100 Multiport NIC, 100 Multiport NIC+

Multiport NIC: \$1131. Multiport NIC+: \$1998.

Similkimene Distributors, NZ; Ph: +64 9577 2963;

www.matrox.com

● Need to add more ports to your server but can't spare the PCI slots? You may want to consider a multi-port NIC. The Matrox 100 Multiport NIC (\$1131) offers four 10/100Mbps Ethernet ports on a single large board. The Matrox 100 Multiport NIC+ (\$1998) adds to this design an Intel i960 CPU and Fast Ethernet switching. As with most multiport configurations, we expected the Multiports' performances to trail those of the single and dual-port competition, but the products showed exceptionally poor performance and proved to be weak com-



INTEL INSIDE: The Intel Pro/100+ Intelligent Server Adapter has an on-board i960 processor.

BENCHMARK TESTS

board processor) is the ultimate configuration. Intel achieves the fastest speeds in NetWare by off-loading part of the protocol stack from the server straight onto the Intelligent Server Adaptor's CPU. But Windows NT 4.0 is unable to take advantage of this method, demonstrating only a slight performance improvement on NICs with i960 processors. Microsoft claims that Version 5.0 of the Network Driver Interface Specification (NDIS)—which will accompany Windows NT 5.0—will have this capability. In the meantime, Windows NT shops may want to hold off buying i960-enabled server NICs.

Adaptec's entries delivered dissimilar results, with the Single besting the Duo in throughput on our segmented network. The Single's speed can be attributed to a new Adaptec-manufactured Ethernet controller chip that replaces the Duo's older controller. Adaptec is developing dual and quad cards that use the new chip.

The methods that Intel, Compaq and Adaptec use to perform asymmetric port aggregation merits brief explanation. The software binds the networking protocol to a single primary port, which is the only link for sending and receiving data. The software sits between the protocol and the NIC and distributes ongoing traffic

evenly to all NICs in its aggregation group.—*Analysis written by Kevin Young*

How We Tested

We used two identical test-beds and configured both a flat and a segmented network. We distributed 40 clients over four switches, with each four-port NIC configuration divided into one port per switch. We ran our NetBench 5.01 NIC test, which reads data sequentially from a shared 48MB file located on the server. We used Compaq 1600R servers with dual 266MHz Pentium II CPUs and 512MB of RAM. The clients were 28 Dell Dimension XPS Pro200n 200MHz systems and 12 Dell OptiPlex GXa 300MHz systems, each with 32MB of RAM. The Dimensions had Intel's PRO/100B NICs installed; the OptiPlex used Intel Pro/100+ NICs. We ran full-duplex to the server and half-duplex to the clients, using Windows NT 4.0 with Service Pack 3 and Microsoft NDIS HotFix (which many NICs require for asymmetric port aggregation) and IntranetWare 4.11 with Support Pack 5B. To track CPU utilisation, we used Performance Monitor on Windows NT and XStat with CPU NLM on IntranetWare.

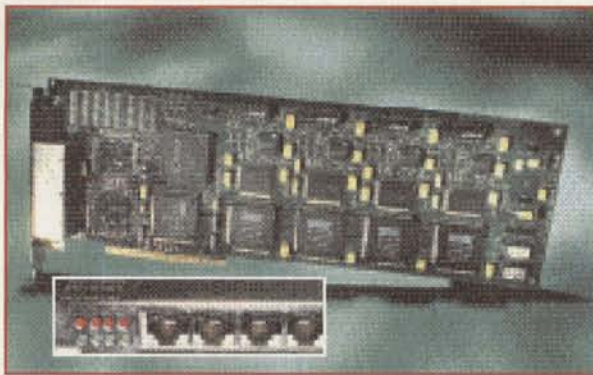
petitors in other areas as well.

Drivers are included for Windows NT 3.51 and 4.0 and NetWare 3.12 and 4.x. The cards are installed as four distinct NICs, with two LEDs per port. In addition, the Multiport NIC+ includes software that lets it operate as a four-segment Ethernet switch. The Multiports' main appeal is that they save you three PCI slots, an important draw if your server is near capacity. The Multiport NIC uses two PCI interrupts, whereas the Multiport NIC+ uses one, further economising hardware resources.

Though we had no difficulty installing any of the Matrox drivers on our test systems, the Multiport NIC+ doesn't work currently with dual-processor NetWare servers, which required us to test it on a single-CPU system. Although the Multiport NIC+ turned in the lowest CPU utilisation score under Windows NT, this was because of the universally low throughput both cards exhibited.

Unlike most of the vendors in this roundup, Matrox does

not provide its own fault tolerance and asymmetric port aggregation software. Instead, it includes a 90-day trial version of Network Specialists' Balance Suite software. Currently, Balance Suite is the only product besides Cisco's Fast EtherChannel that can perform a form of symmetric port aggregation and it does not require a connection to Cisco hardware. To use Balance Suite for more than 90 days, however, you'll have to buy the full version.



FOUR PORTS, NO WAITING: The Matrox 100 Multiport NIC and 100 Multiport NIC+ cards both come with four ports each.

Net Tools

SERVER NICs

Moreover, the Matrox cards are also missing some features that are standard fare on most 10/100Mbps NICs, such as auto-switching.

Switching a port from Ethernet to Fast Ethernet required us to make a manual change to the server driver with the configuration utility. The cards also lack diagnostic software and DMI 2.0 support to ease management, although they include SNMP agents. Matrox offers a three-year warranty and technical support.

Though getting four ports in one card may be appealing, you would be better served looking at the other multiport NICs in this roundup.—LF

3Com Fast EtherLink Server NIC

\$243. 3Com; Ph: 02 9959 3020; www.3com.com.

● The single-port 3Com Fast EtherLink Server NIC (\$243) is touted as a server NIC of high reliability and performance. Though the company backs up the claim with superb performance and extensive troubleshooting and management capabilities, the card's lack of some competitive features and SNMP

NETWORKOPERATING SYSTEMS

Where Did My CPU Go?

NetWare is faster than Windows NT: There's no big surprise in that. On our server NIC tests, the Intel PRO/100 Intelligent Server Adapter delivered 341Mbps throughput on our flat network with NetWare, and 209Mbps with Windows NT. We were surprised, however, to find how differently the NICs interacted with the server's CPUs under each operating system.

Our tests proved that most of the vendors here provide excellent balance between NIC throughput and server CPU utilisation for NetWare. But in every case, our tests for Windows NT brought the system to its knees. Even on dual-processor servers, the CPU utilisation with Windows NT averaged about 90 percent on both processors, whereas with NetWare, utilisation stayed roughly in the 10 to 50 percent range across all products on the primary CPU.

In recommending a server NIC, we caution readers to look beyond sheer throughput and consider the impact on system resources—most notably, processor utilisation. Windows NT throws that

measuring stick to the floor. What does this mean to Windows NT shops? Higher-priced NICs with on-board Intel i960 processors will buy you nothing extra. You're better off spending your money on additional system CPUs for your server and buying a lower-priced NIC.

None of the NIC vendors we spoke with seemed surprised at our findings. Most look to Microsoft's release of Windows NT 5.0 to remedy the situation. Several NIC manufacturers represented here point the finger at NDIS (Network Driver Interface Specification), and our testing bears this out.

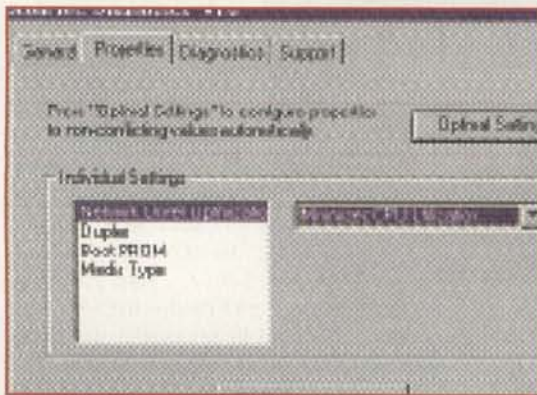
The NDIS layer sits between the networking protocol stack and the NIC driver, much like NetWare's ODI (Open Data-link Interface) specification. Vendors we talked with feel that NDIS is much less efficient than ODI and claim it as the direct cause of the NICs' high CPU utilisation.

Microsoft disagreed with this conclusion, offering us several tuning parameters they felt would improve performance. Although some, such as adjusting the TCP

window size, may be useful in specific situations, none of the vendors explicitly suggested we use them before testing.

Besides NDIS, another contributing factor to high CPU utilisation might be the modular nature of Windows NT's architecture, which introduces module-to-module communication overhead. This modularisation prevents a malfunctioning application or process from bringing down the entire system. NetWare does not follow the safer compartmental paradigm, and consequently, avoids much of the inherent overhead. Though the result is faster throughput, NetWare's architecture is more appropriate for file serving than for running general-purpose applications.

Finally, an obvious contributor to performance differences is our choice of protocols. For the server NIC tests, we used IPX for NetWare and IP for Windows NT, which aren't directly comparable. We based our choices on pretesting a number of client scenarios. Neither Microsoft nor Novell, however, felt that protocol choice alone could lead to the performance differences we experienced. Our results were likely caused by a combination of NDIS, modularisation, and protocols.—Kevin Young and Jeffrey G. Witt



CONTROL CLUTTER: 3Com's menus include a wide variety of controls to configure the adaptors.

agents kept us from making an unconditional recommendation.

The Fast EtherLink contains three activity LEDs on the rear panel. Rather than using an on-board CPU to ease server processor utili-

sation, the card employs a 3Com-developed custom ASIC chip that optimises data throughput between the NIC and the PCI bus. 3Com says that this technique, called *Parallel Tasking II*, provides much of the benefit of an on-board CPU without the expense and power consumption. Our tests bore this out, at least under NetWare, where the Fast EtherLink showed extremely low CPU utilisation and top-notch throughput. Speeds under Windows NT were above average.

Whereas the card lacks port-aggregation software—featured in all the other cards we tested except Adaptec's Single unit—this soft-

ware is in development, with expected completion by fall. The current product provides VLAN support when connected to compatible switches, an advanced feature seen elsewhere only in Intel's PRO/100 Intelligent adaptor. But the 3Com NIC can support only 16 VLAN connections, as opposed to Intel's 64.

Though the card lacks an SNMP agent, 3Com makes managing its NICs simple. In addition to DMI 2.0 support, the company's Self-Healing Drivers attempt to correct common errors without user input, and the resilient server link (RSL) drivers automatically switch to a backup NIC if the primary fails. As with the Intel cards, 3Com's support dynamic code-loading to optimise your NICs to the server's configuration.

SUMMARY OF FEATURES

Server NICs



■ YES ■ NO □ OPTIONAL

Products listed in review order

	Adaptec ANA-69011 Single32 Fast Ethernet NIC	Adaptec ANA-6922 Duo 2-Port Fast Ethernet NIC	Compaq NC3122 Fast Ethernet NIC	Intel PRO/100+ Server Adaptor	Intel PRO/100 Intelligent Server Adaptor	Matrox 100 Multiport NIC	Matrox 100 Multiport NIC+	3Com Fast EtherLink Server NIC
Price	\$169	\$735	\$520	\$258	\$866	\$1131	\$1998	\$243
General								
Number of ports	1	2	2	1	1	4	4	1
Maximum number of boards per server	8	8	Server limited	Unlimited	Unlimited	4	4	16
Supports 10/100 Mbps	■	■	■	■	■	■	■	■
Autoswitch	■	■	■	■	■	■	■	■
32- or 64-bit bus	32-bit	32-bit	32-bit	32-bit	32-bit	32-bit	32-bit	32-bit
On-board CPU	■	■	■	■	■	■	■	■
CPU type	N/A	N/A	N/A	N/A	Intel i960	N/A	Intel i960	N/A
On-board memory	8K	6K	3K	6K	1MB	None	1MB	4K
Included drivers:								
Window NT	■	■	■	■	■	■	■	■
NetWare 3.x	■	■	■	■	■	■	■	■
NetWare 4.x	■	■	■	■	■	■	■	■
Other OS support	Windows 95, 98	SCO Unixware	SCO Unixware	Windows 95, SCO Unixware, Sun Solaris	Windows 95, SCO Unixware, Sun Solaris	None	None	None
Ethernet controller chip	Adaptec	DEC	Intel	Intel	Intel	DEC	DEC	3Com
Fault tolerance	■	■	■	■	■	■	■	■
Redundant links	■	■	■	■	■	■	■	■
Administration and Management								
Bandwidth aggregation/load balancing	■	■	■	■	■	■	■	■
Third-party software included	■	■	■	■	■	■	■	■
Fast EtherChannel	■	■	■	■	■	■	■	■
Full-duplex support	■	■	■	■	■	■	■	■
Diagnostics included	■	■	■	■	■	■	■	■
SNMP agent	■	■	■	■	■	■	■	■
RMON	■	■	■	■	■	■	■	■
Bus mastering	■	■	■	■	■	■	■	■
MII connector	■	■	■	■	■	■	■	■
DMI 2.0 support	■	■	■	■	■	■	■	■
PCI Hot Plug	■	■	■	■	■	■	■	■
VLAN support	■	■	□	■	■	■	■	■
Cisco ISL VLAN support	■	■	■	■	■	■	■	■
ACPI support	■	■	■	■	■	■	■	■
Shared hardware interrupt support	■	■	■	■	■	■	■	■

N/A: Not applicable—The product does not have this feature.



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Net Tools

FROM THE BENCH

TERMINAL SERVERS

Microsoft Thinks Thin

By David Chernicoff

The most lucrative segment of the multiuser server market is in terminal devices. A single server performs the processing for multiple thin clients, which is ideal for data entry tasks such as inventory and reservations where a standalone PC is overkill. This market has long been dominated by Unix and mainframe vendors, but Microsoft has had an eye on it, too.

Microsoft's biggest obstacle was Windows NT's lack of multiuser support. To overcome this, the company purchased the MultiWin technology that Citrix used in its WinFrame server, which lets multiple clients run Windows applications in terminal sessions.

WinFrame was based, however, on the Windows NT 3.51 code base, and the sweeping architectural changes in Windows NT 4.0 made porting WinFrame a significant task. Instead, Microsoft li-

which brings the Windows interface to shops with terminal workers employing Windows CE-based thin clients. Moreover, Microsoft foresees that Terminal Server will be the foundation for network, Internet and palmtop thin-client devices using embedded versions of Windows CE.

We also tested Citrix's MetaFrame 1.0, which sits on top of Terminal Server and extends its capabilities to non-Windows clients. It supports most OSes and also adds significant capabilities such as support for non-IP networks, load balancing, and additional connection options that provide a more complete solution.

Microsoft Windows NT Terminal Server Edition

Code-named for the mythical, multiheaded Hydra, Microsoft Windows NT 4.0 Terminal Server Edition (with ten client access licenses, \$1869) is the company's first multiuser version of Windows NT. Terminal Server brings the functionality of Windows NT 4.0 to terminal sessions and offers trouble-free connectivity with Windows-based clients.

The version we tested includes ten CALs, each additional client requires a client access license (CAL) priced at around \$50. If you don't already have a Windows NT Workstation (NTW) license, you will need to get one, that will also cost you an extra \$400 per client.

Installation went smoothly, but you need a hefty system to service

even just a few clients. Terminal Server requires 32MB of RAM for the OS and 4 to 12MB for each client, which made our dual-processor server with 160MB of RAM adequate for only ten (or fewer) clients. The install was almost identical to that of Windows NT Server, and we had no trouble with it.

Terminal Server uses Remote Display Protocol (RDP), a proprietary extension to the T-120 remote-display-and-control protocols. RDP clients replicate a Windows NT GUI, but the client machine must be running Windows. Also, RDP works only on TCP/IP networks. To run on non-Windows and/or IP-networks, you'll need to run MetaFrame.

We tested the RDP client on three devices: a Windows NT Workstation, a Windows 95 PC, and a Wyse Winterm 3315SE thin client. The Winterm uses an embedded version of Windows CE, which allowed it to run RDP. Once

the clients were connected to the network, a client dialog box asked us for the server's IP address. After we entered it, we were on our way.

To test performance, we installed Microsoft Office 97 on our Terminal Server. Response time for normal editing tasks on clients was acceptable even with all three clients in simultaneous use, though spell-checking a 30-page document on each slowed performance noticeably. Performance wasn't unacceptably slow, but it does indicate that client activity can affect even a powerful server with a fairly light load.

Microsoft Windows NT 4.0 Terminal Server Edition. Price: \$1869. Microsoft; Ph: 02 9870 2200; www.microsoft.com.au

MetaFrame

Though Microsoft has claimed the Windows CE world as its own, MetaFrame 1.0 (\$8325 with 15 client licenses), from Citrix, brings the capabilities of Mi-

crosoft Windows NT 4.0 Terminal Server to non-Windows clients. Expressly made to run on top of Terminal Server, MetaFrame also includes support for additional networking protocols, connection options and load balancing.

Instead of Microsoft's RDP, Citrix uses its own Independent Computing Architecture (ICA) clients, which lets MetaFrame operate with DOS, Java-based, Mac and Unix devices as well as older terminal stations. Each ICA client requires a Microsoft NWT and CAL license, however, as well as the Citrix ICA license.

Installation on our server was without incident. Because ICA has no support for Windows CE clients, we used a different ver-



FLEXIBLE CONNECTIONS: MetaFrame lets you configure varied connection types.

sion of the Wyse Winterm 2315SE. For testing MetaFrame on non-Windows devices, we used a Power Macintosh G3 and a Sun Netra Unix Workstation with Solaris. In all cases, the terminal sessions popped up without a hitch and provided an uneventful client session with our server-based application.

MetaFrame also adds significant value in certain network environments. MetaFrame's ICA protocol is not limited to TCP/IP connections, as is RDP. MetaFrame lets you use networks that employ IPX/SPX and NetBUI, so if you aren't running an IP network, MetaFrame is your only choice.

Moreover, this product includes a wide variety of network connection options unsupported by Terminal Server. MetaFrame supports direct-dial connections to Terminal Server, as well as multiport serial access. Trading performance for price, serial access lets you connect many clients to the server's serial ports



VIRTUAL NT: The Terminal Server client replicates the Windows NT desktop.

censed Citrix's technology and was able to create a multiuser version of Windows NT 4.0, thereby giving Microsoft a strong entry into the thin-client market.

The result is Microsoft Windows NT 4.0 Terminal Server Edition,

Net Tools

FROM THE BENCH

cheaply and obviates the need for additional network hardware or software to route the connections.

If you're planning on using more than 15 thin clients, Citrix offers a useful option not available from Microsoft. WinFrame Load Balance Option Pack (\$2495 per server) lets MetaFrame distribute the client

load across multiple servers.

MetaFrame 1.0. Price: With 15 client licenses, \$8325. Citrix; Ph: 02 9980 0800; www.citrix.com/products/metaframe.asp

NETWORK MANAGEMENT

Slim Management

By Greg Alwang

Administrators often spend more time managing their management software than they do the network. Platinum Technology's ProVision Network Monitor (recently renamed by Platinum form AlertPage Enterprise 4.1 when the company acquired AlertPage Enterprise's developer, Geneva Software), is designed to plug into larger management pack-

ages to provide easier and more extensive reporting on network services such as FTP or Web servers. ProVision (\$1600 per server) includes exhaustive reporting and alerting options, plus extensive SNMP support for easy connectivity with network management packages such as HP OpenView.

ProVision was extremely easy to install. On loading the software onto a Windows NT client PC, we

immediately began receiving data on network devices from the Discovery option. Extensive filtering options let you tailor alert notifications for network faults by specific device and select a notification method—for example, via e-mail or pager. ProVision also translates cryptic error messages into plain-English alarms, a feature often seen only in high-end management tools.

This product automatically discovers all active Windows NT services, auto-detects new devices, and even restarts failed Windows services remotely. ProVision can monitor multiple NetWare NDS trees and test NetWare and Windows NT logons and authentications. Perhaps its best feature is the reporting engine, Network Report Card (NRC), which lets you group services, devices and ap-

plications by business function.

Notable features in the new version include a Profile Wizard for building reports and enhanced SNMP support for integration with large-scale management



IN THE RED: Executive-level reports show basic information graphically.

products. In addition to a database with over 6000 SNMP traps, there's an Event-to-Trap translator that converts non-SNMP alarms and events into SNMP traps usable by the larger packages.

ProVision Network Monitor. Price: \$1600 per server or SNMP device. Platinum Technology; Ph: 02 9927 6390. www.platinum.com

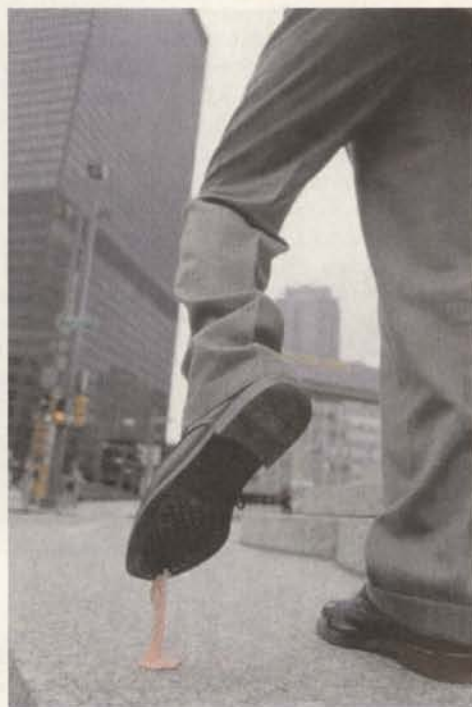
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Mastering Disk Management

By Warren Ernst

Until now, managing your networked disk resources on Windows NT has been a tedious, multistep process. Often, you had to resort to a mishmash of Windows NT tools and third-party utilities that never quite

need to install an agent manually on each Windows NT client to monitor client use of shared resources. SRM also requires five components from Microsoft's Internet Service Manager, a host of modules within Data Access Components 1.5, and other Microsoft Windows NT components. The good news is that SRM goes a long way to make this onerous setup manageable. The installation disk scanned our server prior to the

install, then listed the components that we needed. Nevertheless, our setup required a call to tech support; it turned out we needed a patch for using SRM with a FAT partition.

Leaving that behind us, we were better able to appreciate the program. SRM is elegant and intuitive to use; from a browser, we could view free space on drives and which users owned the largest files. SRM's charts contain plenty of hypertext links that make it easy to drill down for details.

Storage Resource Manager. Price: Single-server, \$1600; each additional server, \$600-\$700. SCSI Integration; Ph: 03 9281 3889; www.highground.com



EASY ON THE EYES: SRM provides detailed information via its attractive Web interface.

filled the bill. But HighGround Systems ends all that with Storage Resource Manager or SRM (\$1600). This program provides a flexible automated quota and disk-space monitoring system for servers that's easy to administer from a single Web interface.

Setting up the program requires considerable time and effort, though. You'll need a server with 64MB of RAM running Windows NT 4.0 with Service Pack 3 and Microsoft Internet Information Server (IIS) 4.0. To enable polling and reporting to the central management console, you'll

COMMERCE SERVERS

Show Me the E-Money

By John Garriss

E-commerce development means different things to different people. Web storefronts need to engage the customer and require mechanisms that provide personalisation, site

analysis and online payment processing. Business-to-business sites require standards-based data-transfer formats, good security and integration with existing systems. The point is that one size definitely does not fit all.

Net Tools

FROM THE BENCH

Domino.Merchant 2.0 Server Pack and Microsoft Site Server 3.0 Commerce Edition both offer everything you need to build an e-commerce site. Site Server includes a wealth of integrated tools for site analysis, site-wide search, and ad serving. Lotus bases Domino.Merchant on its Domino databases (as seen in LotusNotes) and a thorough setup wizard to do all the site creation.

Though both provide templates and wizards for building starter sites, you will also need to tailor your site to grow with you—by committing to the development platform your product uses. Site Server lets you customise pages via Active Server Pages (ASP) and Component Object Model (COM) component development.

Domino.Merchant provides limited customisation options using wizards and pre-defined content-creation tools. Although the Domino architecture allows for complex Web development through LotusScript (Domino's macro language) and Java, they require a separate purchase.

In the final analysis, Site Server gives you more options than Domino.Merchant. Though the latter product can meet the needs of small companies with simple business requirements, Site Server provides the more comprehensive and versatile platform.

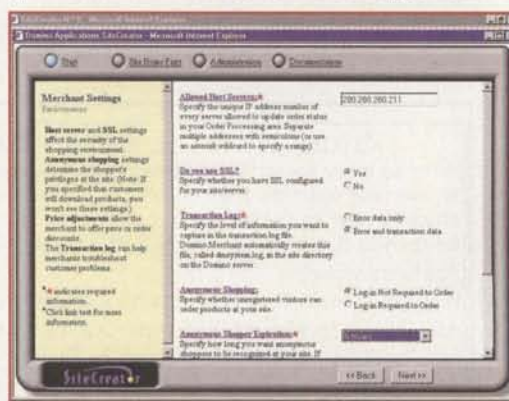
Domino.Merchant Server Pack

Lotus is pitching its Domino.Merchant 2.0 Server Pack (\$5260 per server) at small, non-Domino

shops that want to set up a commerce-enabled Web site. The massive scope and complexity of the Domino environment, however, makes this a tall order; we found this product better suited to shops with the know-how and tools to exploit Domino's strengths.

All data, including Web sites, is stored in Domino-proprietary databases. Domino.Merchant provides a Site Creator wizard that asks dozens of questions about every aspect of page design, from SSL security to Web layout, and then uses the answers to build your site.

On our Pentium 166 with 128MB of RAM, the process of compiling the Domino databases took over 90 minutes. We found the resulting frames-based site easy to navigate and visually appealing. Yet sometimes, it didn't update certain frames properly, forcing us to exit and reenter the site. Also, we were disappointed



JUST COMPLETE A FORM: The Java Site Creator collects information about your Web site.

with Site Creator's lack of flexibility. For example, it asked us to choose from limiting either/or-type options, such as whether our products were available via download or required shipping.

Domino's databases provide security superior to Site Server's. The server maintains a list of users who have various access levels, and users with the appropriate access can log on and make changes. Also, Domino leverages its document management capabilities by letting administrators set up workflow-based approval mechanisms that

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1. How often do you read *PC Magazine Australia*?

- ☐ Every month ☐ Every few months
☐ First time

2. Where did you get this copy of *PC Magazine Australia*?

- ☐ Subscription ☐ Newsagent
☐ A friend ☐ Work
☐ Other _____

3. How many computer magazines do you buy each month?

- ☐ Rarely buy ☐ One
☐ Two ☐ Three
☐ More than three

4. In the past month, how often have you visited our Web site, www.zdnet.com.au?

- ☐ Never ☐ Once
☐ Several times ☐ Frequently

5. What type of articles interest you most?

- ☐ Product reviews
☐ Web-related articles
☐ Product news
☐ Networking
☐ Game reviews
☐ Other _____

6. What is your level of responsibility?

- ☐ Owner/Principal
☐ Management
☐ Staff

7. What best describes your occupation?

- ☐ Computer Systems/Networking
☐ Administration/General Management
☐ Consulting/Education

☐ Student (skip questions 8-11)

☐ Other _____

8. How many people are employed by your company?

- | At this location | Entire organisation |
|--|--|
| ☐ 20,000+ | ☐ 20,000+ |
| ☐ 10,000-19,999 | ☐ 10,000-19,999 |
| ☐ 5000-9999 | ☐ 5000-9999 |
| ☐ 1000-4999 | ☐ 1000-4999 |
| ☐ 500-999 | ☐ 500-999 |
| ☐ 100-499 | ☐ 100-499 |
| ☐ 50-99 | ☐ 50-99 |
| ☐ 20-49 | ☐ 20-49 |
| ☐ 10-19 | ☐ 10-19 |
| ☐ 1-9 | ☐ 1-9 |

9. How many PCs and notebooks are currently in use at your company?

- | At this location | Entire organisation |
|--|--|
| ☐ 25,000+ | ☐ 25,000+ |
| ☐ 10,000-24,999 | ☐ 10,000-24,999 |
| ☐ 5000-9999 | ☐ 5000-9999 |
| ☐ 2500-4999 | ☐ 2500-4999 |
| ☐ 1000-2499 | ☐ 1000-2499 |
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| ☐ 50-99 | ☐ 50-99 |
| ☐ 25-49 | ☐ 25-49 |
| ☐ 10-24 | ☐ 10-24 |
| ☐ 9 or fewer | ☐ 9 or fewer |

10. Please indicate the operating systems and network environments currently in use at your company:

Client operating systems

- ☐ Windows 95/9x ☐ Windows NT
☐ OS/2 ☐ AS/400

☐ Mac ☐ Unix

☐ Other _____

Applications suites/groupware

- ☐ Lotus Notes ☐ MS Exchange
☐ MS BackOffice ☐ MS Office
☐ Lotus SmartSuite ☐ Corel Office
☐ Other _____

Server operating systems

- ☐ Novell Netware ☐ Unix
☐ Windows NT Server
☐ Other _____

11. How often do you purchase hardware or software products?

- ☐ Once a month ☐ Several times a year
☐ I am not involved in purchasing for my company

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Comments about the Cover CD:

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Net Tools

FROM THE BENCH

can do things such as ensure that content is approved prior to posting.

Unlike Site Server, Domino.Merchant's third-party-tools integration is limited. Although the product lets you import single HTML files into a Domino database, the process is fairly cumbersome and time-consuming and won't work with standard Web-authoring tools—as it does with Site Server.

If you want to do any extensive customisation, you'll need to use the full Domino development client, Notes Designer for Domino, which costs an additional \$703.

Domino.Merchant 2.0 Server Pack. Price: \$5260. Lotus Development; 1800 252 480; www.lotus.com

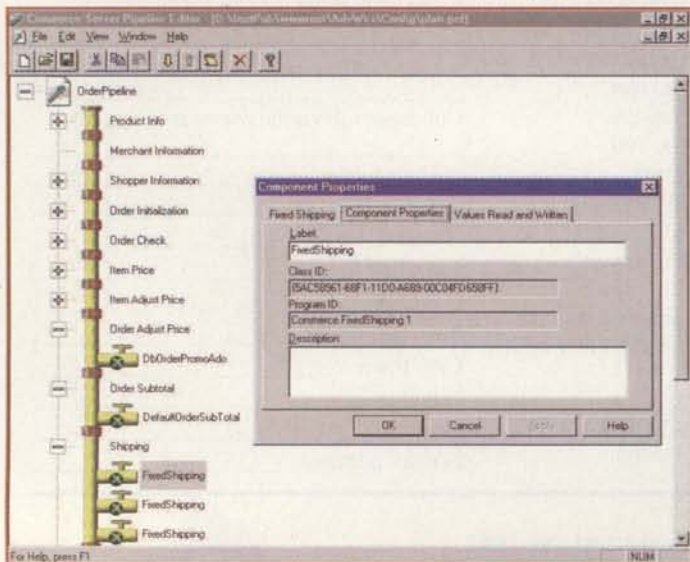
Microsoft Site Server Commerce Edition

A special-purpose version of Site Server Standard Edition, Microsoft Site Server 3.0 Commerce

foundation. Specify a number of Windows NT configuration options (such as the required ODBC data sources) and input specific site details, and the wizards generate the Web pages for the starter site and the administration site—as well as a set of database-schema files that it loads into your ODBC-compliant database. We found that this process was much faster with Site Server than with Domino.Merchant.

You make updates to your site through the Microsoft Management Console (MMC). And unlike Domino.Merchant, it lets you use standard HTML editors on your pages.

The MMC also lets you add new products and departments (or categories) to your product list and view all processed orders



FLOWCHART: The Pipeline editing feature shows all the COM components involved in an order-processing phase.

Edition (\$7639) is a fine set of interrelated products that rely on a combination of Active Server Pages (ASP) scripts, custom-built COM components, and third-party components to build and grow your site.

Commerce Edition provides wizards to ease building your site

and shoppers on your site, as well as define cross-selling mechanisms.

Site Server's unique software Pipeline streamlines order processing. Pipeline is a set of tasks that define the process—such as validating a credit-card number, approving payment, modifying in-

ventory, and creating a purchase order. Its tasks correspond to a set of COM components.

Third-party vendors and developers can build their own components, and in-house developers can extend their sites by writing components that perform legacy integration. Unlike Lotus, Microsoft includes an Ad Server in the package that lets you track ad hits and process ad requests.

ISDN ROUTERS

The Amazing Tunnelling Router

By Les Freed

Targeted at the branch office, the Intel Express 8100 Router (\$1430) provides two functions that such users need most. These are an ISDN router for sharing an Internet connection and Virtual Private Network (VPN) capability, a low-cost way to connect to the corporate WAN via the Internet.

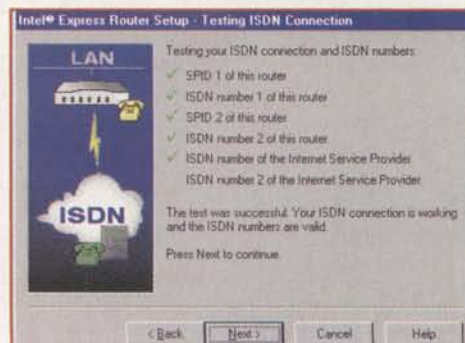
The Express 8100 is a gray, cigar-box-size unit with seven status LEDs on the front and 10/100Mbps auto-sensing Ethernet and ISDN U interface connectors on the back. One of the first small routers we've seen to include a dual-speed Ethernet port, it supports Network Address Translation (NAT), which lets connected PCs access the Internet using a single IP address. The Express 8100 lacks an analogue phone port, however.

An installation wizard walks you through one of three canned scenarios: remote LAN access, Internet Access via an ISP, or VPN connection via an ISP with optional Internet Access. Each attempts to auto-detect switch type and SPID information, and after you configure the line, the wizard places test calls to check your connection.

Once the Express 8100 is run-

ning, the Device View software eases the task of configuring and monitoring the unit. The router also has a rear button that resets the Express 8100 to the factory configuration, a feature we liked

Microsoft Site Server 3.0 Commerce Edition. Price: \$7639 including a 25 client license. Microsoft; Ph: 02 9870 2200; www.microsoft.com.au



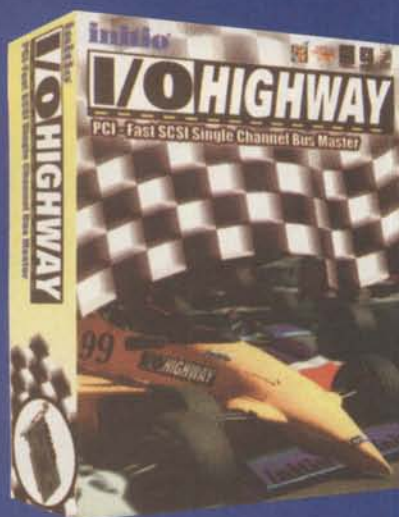
HANDS-OFF SETUP: As the setup wizard completes each step, it adds a green check mark.

and thankfully found impossible to hit by accident.

A VPN uses strong data encryption and IP tunnelling to create a secure Internet connection for private data. Because the Express 8100 uses an Intel-proprietary tunnelling protocol, you'll need one of these units on either side of the connection. We tested only its routing capabilities. The 140-bit encrypted connection can pass through any network protocol, but the routers each must have a fixed IP address. When used as just a router, the Express 8100 can use a dynamically assigned IP address.

Intel Express 8100 Router. Price: \$1430. Intel; Ph: 02 9937 5800; www.intel.com ■

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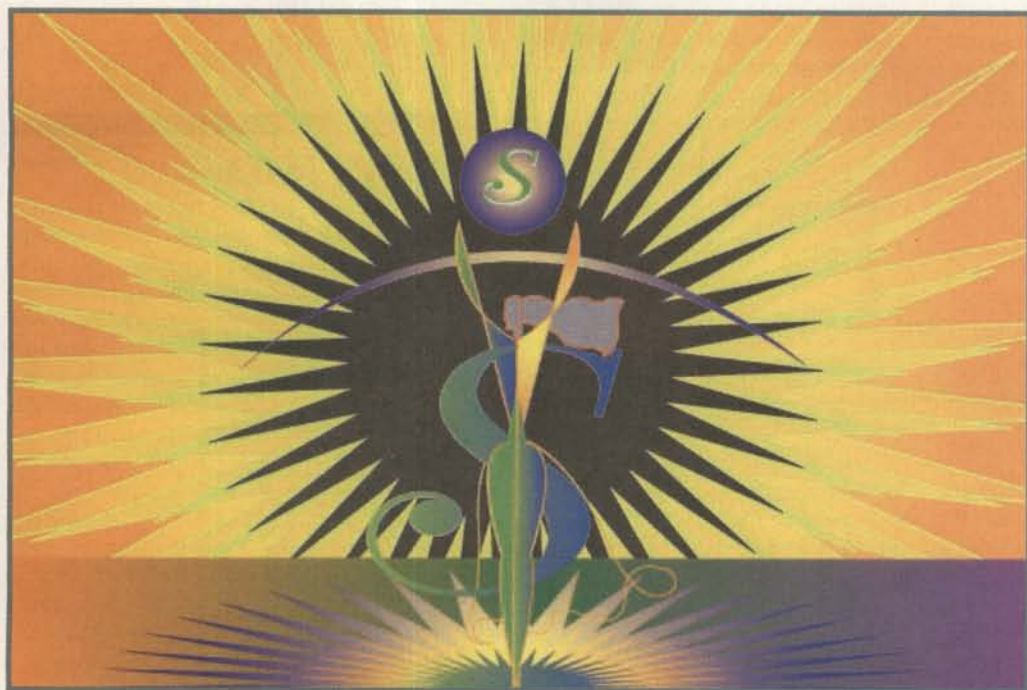
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The 1998 PC Magazine Shareware Awards

We showcase our top picks and present our overall favourite: ICQ, the Internet chat phenomenon from Mirabilis.

By Sheryl Canter

The Internet is a natural distribution mechanism for shareware, and with the spectacular growth of the Internet, the shareware industry is booming. In this year's Shareware Awards contest, editors sifted through nearly 14,000 entries.

The Shareware Awards contest honours the best PC-based shareware products released or significantly upgraded in the last year. All programs available from the ZDNet Software Library (www.zdnet.com.au) that met this criteria were automatically entered into the competition.

The 60 finalists and 12 category winners in the PC Magazine contest are listed in the sidebar "PC Magazine Finalists."

Web Development

GDIdb

The winner in the Web Development category is GDIdb, a tool for publishing ODBC-compatible databases and spreadsheets on the Web. It works by executing a script file that describes how to translate the data source into a series of HTML documents. A Script Wizard lets you create scripts without having to learn the GDIdb script language. To obtain total control over the appearance and structure of the generated HTML pages, you can edit the script file manually.

If you connect to the Internet through a dial-up or ISDN connection, you can use GDIdb's built-in FTP facility to copy the generated HTML documents to your Web server. An option lets you upload only those files that have changed—which is useful if your database is large.

GDIdb does not create a live database on the Web server; it's a static page generator. But updating is

INSIDE

TUTOR: The new PC 98 System Design Guide provides specifications for required and recommended features for a wide variety of PC types. The idea is to make sure you're getting the hardware you need when you buy a new system. *Page 169.*

OPERATING SYSTEMS:

The best system is a well-maintained system, and Windows 98's Maintenance Wizard can help you keep yours functioning at its peak. We take a look at its tools and the System Configuration Utility. *Page 171.*



PC SOLUTIONS: Managing toolbars in Windows 98; an alternative to a bootable SCSI adaptor; a disappearing toolbar in IE3's Mail module; creating an acronym list in Word; transposing Excel ranges; DOS-style printing in FoxPro for Windows. *Page 201.*

easy since the entire process can be automated and executed on a schedule. The program can also be run from the command line, for use with external schedulers and scripts. GDIDb offers a painless, low-cost way to publish databases for Web access.

GDIDb, v3.1.0. Global Data Industries; www.gd-ind.com.

HTML Editors

HomeSite

HomeSite 3.0.1 is the winner in the HTML Editor category. This code-based tool lets you create sophisticated Web sites without having to memorise HTML syntax details. When you type an HTML tag in the edit window, a number of options appear in a pop-up list. Select the one you want, and HomeSite will insert the syntax for that option. A customisable tag toolbar will automatically insert opening and closing tags with a mouse click. Tag editors let you select options from a dialog box, and wizards make quick work of frames, tables, pop-up windows, tables of contents and other advanced features.

HomeSite features a highly customisable, two-pane interface. On the left, it displays lists of files, HTML tags, and reusable code snippets. On the right is an edit window with tabs for each open file. You can toggle between the edit window and a preview window with a single keystroke or mouse click.

A Project Manager lets you group together the different files that make up your Web site. You can perform search-and-replace operations across all the files in a project, and you can verify a project's hyperlinks. HomeSite is a beautifully designed program that deserves its fame as one of the best HTML editors on the market.

HomeSite 3.0.1. Allaire; www.allaire.com/products/homesite.

E-mail, News Readers, Chat

ICQ

The winner in the E-Mail, News Readers, Chat category—and the overall winner of PC Magazine Australia's Shareware Awards

contest—is ICQ from Mirabilis, an instant messaging utility. There is something about being on a computer network, invisibly connected to hundreds, thousands or millions of people, that makes people want to chat.

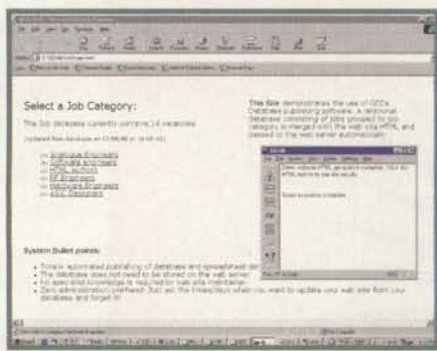
Even the earliest network operating systems had instant messaging capabilities, and instant messaging has been popular on the Internet since Jarkko Oikarinen created IRC (Internet Relay Chat) in 1988.

Feature-rich and user-friendly, ICQ (I Seek You) was introduced by Mirabilis in November 1996 and quickly became the tool of choice for real-time communication on the Internet. ICQ informs you when friends or coworkers log on to the Internet so you can initiate a real-time chat session. Unlike any other instant messaging product, you can see what other people type before they press the Enter key. You see them pausing to find the right word and backspacing to correct typos. To add further personality to your messages, you can change the foreground and background colours, and the size, type and colour of your font.

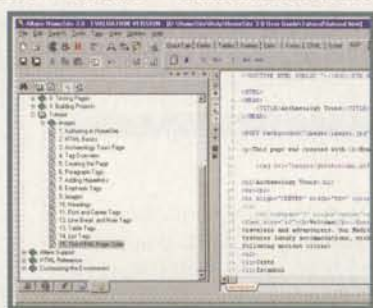
If no one you know is currently online and you still feel like chatting, you can search for random users in one of several groups: General Chat, Romance, Games, Students and various age groups.

Users choose which group to belong to and specify whether they are available for random chats. You can participate in group chats by adding the chat room of your choice to your ICQ contact list. Users can create new chat rooms, and there are a huge number of them. In addition to chat, ICQ can notify you when you receive e-mail, let you hide from people you don't want to talk to, access voice communication and group gaming software, and much more.

ICQ handles communication through a server that stores the participants' registration information. Within six months of its introduction, ICQ received 850,000 registrations. Today it has more than 11 million registrations, of which 6 million are active.



GDIDb uses scripts to generate html representations of databases.



HOMESITE'S thorough tutorial walks you through all the program's features.

The rapid growth has meant an overloaded server at times, but the company struggles to keep up.

ICQ, Beta (DLL 1.30). Price: Free during beta period. Mirabilis; www.mirabilis.com/icqhome-page.html.

Desktop Accessories

Judy's TenKey

The winner for Desktop Accessories is Judy's TenKey, a high-powered calculator that features a history tape, selectable calculator syntax, and built-in financial and statistical calculations. The customisable display lets you hide the features you don't need—for example, the number pad or trigonometry functions.

The history tape records your calculations in a scrolling list, which you can save to disk. If the ten built-in memory locations are not

enough, you can use the tape for additional memory; right-click on a tape number to reuse it. The right-click menu also lets you modify a number you entered and have the tape recalculate. The number of lines displayed on the tape and the font used for numbers and notes are all customisable. You can also hide the tape completely.

Judy's TenKey does not lock you into a calculator syntax. You can switch between calculator-style, adding machine-style, and Reverse Polish Notation.

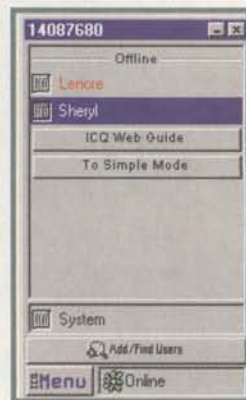
If these styles are unfamiliar to you, consult the online Help file for detailed instructions. As an all-purpose calculator that doesn't overwhelm you with features, this is one of the very best.

Judy's TenKey, v4.0. Judy's Applications; www.judysapps.com.

Applications

NoteTab Pro

NoteTab Pro, the shareware winner in the Applications category, is a plain-text and HTML editor that does math on the side. It can handle files up to 16MB in size, and recognises DOS, Unix and Macintosh text. A filter lets you choose between the ASCII



ICQ informs you when a person on your contact list logs on to the Internet.

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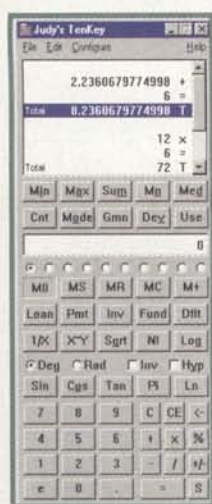
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JUDY'S TENKEY lets you select the calculator syntax.

character set used by DOS and the ANSI character set used by Windows.

The highly configurable user interface features a customisable toolbar, and a tab bar for switching between documents. You can perform search-and-replace operations across all open documents. A special outline format lets you jump instantly to key sections in a document. You can also embed hyperlinks in documents.

One of the product's most useful features is the Clipbook, which is a collection of pastable text snippets, each associated with header text. You can paste any item in the Clipbook by selecting or typing the header.

Clipbooks also support a syntax that lets you open URLs, execute programs, or send e-mail. Clipbooks have many uses, and the program comes with some prebuilt Clipbook Libraries. For example, there is an HTML library that can insert tags into an HTML document.

Other NoteTab Pro features include a spell-checker and thesaurus, multiple undo/redo, and the ability to calculate mathematical expressions embedded in text. NoteTab Pro provides a lot of editor for very little money.

NoteTab Pro, v4.011. Eric G. V. Fookes, Geneva, Switzerland; Fookes@sc2a.unige.ch; www.notetab.ch.

Applications

Power Utility Pak 97

Power Utility Pak 97 (PUP97) is a set of extensions to Microsoft Excel 97. (An earlier version is still available for Excel 5 and Excel 95.) The program includes 31 utilities, 40 custom worksheet functions, 3 games and some optional shortcut menu



THIS HIGHLY configurable text editor also does math.

enhancements. A large number of the utilities, most of the functions, and all of the games are disabled in the unregistered version of the program.

The utilities are divided into eight categories: Range, Formatting, Worksheet, Workbook, Printing, Date & Time, Chart and Object. A text tool lets you change case or modify text in a specified range. With the cell-lock utility, you can apply locks in a single operation to all cells meeting stated criteria (for example, all cells with formulas).

Another tool lets you add bookmarks to spreadsheets. PUP97 includes an alarm utility that can help you get to meetings and appointments on time. There's a tool for batch printing, and another for selecting cells by value.

The worksheet functions include a number-to-dollar text function, extensions to Excel's date-and-time repertoire, and much more.

PUP97 is written entirely in Excel's VBA (Visual Basic for Applications) script language, and you can purchase the source.

Power Utility Pak 97, v3.0b. JWalk & Associates; www.j-walk.com/ss/pup/pup97.htm.

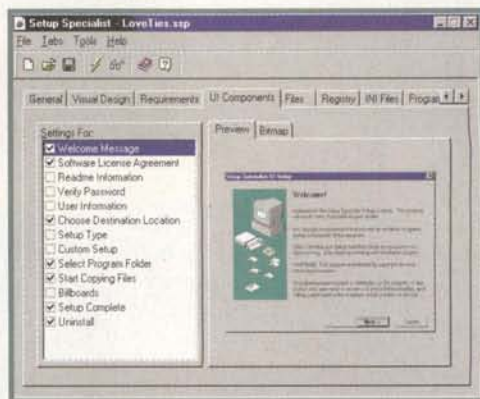
Programming Tools

Setup Specialist 97b

The champion in the Programming Tools category is Setup Specialist 97b. This full-featured install program generator rivals—and in some areas surpasses—commercial products costing hundreds of dollars more. And Setup Specialist is exceedingly easy to use. A built-in set of training cards walks you through the process

of creating an installation program. You check off options to include any or all of 13 user interface pages, from simple Welcome and Readme pages to a Custom Setup page to a user information page that can record serial number and registration code data. You also can specify any applicable hardware and software requirements right in the install program.

Setup Specialist provides all of the expected features, including support



SETUP SPECIALIST makes it fast and easy to create sophisticated installation utilities for your programs.

for uninstallation, automatic registration for OCXs and OLE-based DLLs, and access to variables defining important directories on the target system. Your setup programs can add data to INI files or the Registry, and can read data from them as well. By creating a simple DLL, you can cause the install program to require valid serial number and registration code data, or to "brand" the executable with user information.

Even if you already own an install program generator, you should evaluate this excellent product. You may switch!

Setup Specialist 97b, v1.56. TG Byte Software; info@setupspecialist.com; www.setupspecialist.com.

Graphics and Multimedia

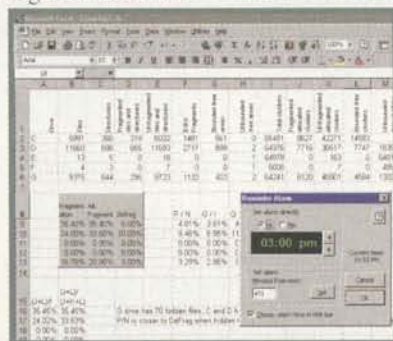
Screen Saver Toolkit

Screen Saver Toolkit, the winner in the Graphics and Multimedia category, lets you create professional, Windows-compatible screen savers that you can distribute royalty-free. A wizard-style interface walks you through the process. Each screen concentrates on a particular

task, such as collecting images, sequencing images, adding sounds and choosing transition effects.

The first step is to create a screen-saver project. You can choose between two types of screen savers: slide show or presentation-style. Slide show screen savers display images in random sequence, whereas presentation-style screen savers display them in a specified order.

The program supports three image file



PUP97 enhances Excel 97 with a variety of tools, including an alarm.

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Tuesday 24 November 10.00am-6.00pm
Wednesday 25 November 10.00am-7.00pm
Thursday 26 November 10.00am-5.00pm

ATTENDEE CREDENTIALS

1 What is your Company/Organisation's primary business (tick one).

- ☐ A. Aerospace
- ☐ B. Communications Carriers (Telco, Broadband, ISP)
- ☐ C. Financial Services: Banking, Insurance
- ☐ D. Healthcare
- ☐ E. IT - Computers/Software
- ☐ F. Manufacturing
- ☐ G. Government/Defence
- ☐ H. Publishing/Media/Advertising/PR
- ☐ I. Transportation/Utilities
- ☐ J. Wholesale/Retail: Non-computer
- ☐ K. Education
- ☐ L. Entertainment
- ☐ M. Computer Reseller/Retailer/VAR
- ☐ N. Systems Integration/Consulting
- ☐ O. Other

NOTE: If you checked M or N, please answer questions 3-6 as if you were employed by your most frequent or typical customer.

2 Please indicate your level of job responsibility (tick one).

- ☐ A. Executive ☐ B. Manager
- ☐ C. Staff

3 Please indicate the category that best reflects your primary job function (tick one).

- Computer Systems/Networking**
- ☐ A. IS/MIS/Data Processing
- ☐ B. LAN/Network Systems
- ☐ C. Internet/Web
- ☐ D. Intranet
- Communications/Telecommunications**
- ☐ E. Data/Telco Communications
- ☐ F. PC/Microcomputer
- ☐ G. Systems Analyst/Software Developers
- ☐ H. Systems Engineer/Integration
- Admin/General/Departmental**
- ☐ I. Executive/Corporate Office
- ☐ J. Financial/Accounting
- ☐ K. Engineering/R&D
- ☐ L. Sales/Marketing
- ☐ M. Other Departmental

Professional/Other

- ☐ N. Consulting (Computer related)
- ☐ O. Training/Education
- ☐ P. Other Professionals
- 4 I specify, recommend, approve, purchase or influence the purchase of the following computer products or services; (tick all that apply).

Local Area Networks

- ☐ A. Network Interface Cards
- ☐ B. Hubs/Switches
- ☐ C. Network OS
- ☐ D. Groupware/Workflow/Email
- ☐ E. Database Management Systems

Servers

- ☐ F. File/Print Servers
- ☐ G. Application/Database Servers

Internetworking

- ☐ H. Bridges/Routers/Gateways
- ☐ I. Remote Access Products
- ☐ J. ATM/Frame Relay Switches/Modems

Network Management

- ☐ K. Network Management Systems/Software
- ☐ L. Network Security
- ☐ M. Network Monitors/Analysers/Test Equipment

Development Tools

- ☐ N. Virus Protection Software
- ☐ O. Help Desk
- ☐ P. Systems Integration Services

WEB Products

- ☐ Q. WEB Browsers/Search Tools/Engines
- ☐ R. WEB Servers
- ☐ S. HTML Authoring/Web Publishing Tools
- ☐ T. Audio/Video/Multimedia Enabling Tools

Communications

- ☐ U. Object Oriented Technology
- ☐ V. Firewalls/Security/Encryption Software
- ☐ W. Computer Telephony Integration (CTI)
- ☐ X. Customer Premises Equipment (CPE)
- ☐ Y. Satellite/Radio Communications
- ☐ Z. Cabling Systems

Wireless Technology

5 Please check the statements below that describe your involvement with networks (tick all that apply).

- ☐ A. I manage networks
- ☐ B. I design networks
- ☐ C. I install networks
- ☐ D. I troubleshoot/fix networks
- ☐ E. I train or support network users
- ☐ F. I develop applications for networks

6 Please check the statements below that describe your involvement with the Internet/intranets (tick all that apply).

- ☐ A. I am involved with planning/developing Internet sites/intranets
- ☐ B. I structure/create content for the Internet/intranet
- ☐ C. I program in development languages for the Internet/intranet

7 Which of the following do you currently work with (tick all that apply).

- ☐ A. AS/400
- ☐ B. Java
- ☐ C. Mac
- ☐ D. Netware
- ☐ E. NT
- ☐ F. Object Technology
- ☐ G. Unix
- ☐ H. Other.....

8 How many employees work in your company: (tick one).

- ☐ A. 50,000 or more
- ☐ B. 10,000 - 49,999
- ☐ C. 1,000 - 9,999
- ☐ D. 500 - 999
- ☐ E. 100 - 499
- ☐ F. 25 - 99
- ☐ G. 1 - 24



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- **Next Generation Enterprise Infrastructure**
Jamie Lewis, President & Principal Analyst, The Burton Group
9.00am-10.00am Wednesday 25 November
- **Year 2000 Compliance? Will Your Current Network Even Make it to Year 2000?**
Bill Conner, President, Nortel Enterprise Data Networks
3.30pm-4.30pm Wednesday 25 November
- **Internet & the Global Enterprise**
Jerry Gregoire, Vice President and Chief Information Officer, Dell Computer Corporation
9.00am-10.00am Thursday 26 November
- **The Thin-Client/Server Approach to "Thin Computing"**
Mark Templeton, President, Citrix Systems
1.00pm-2.00pm Thursday 26 November

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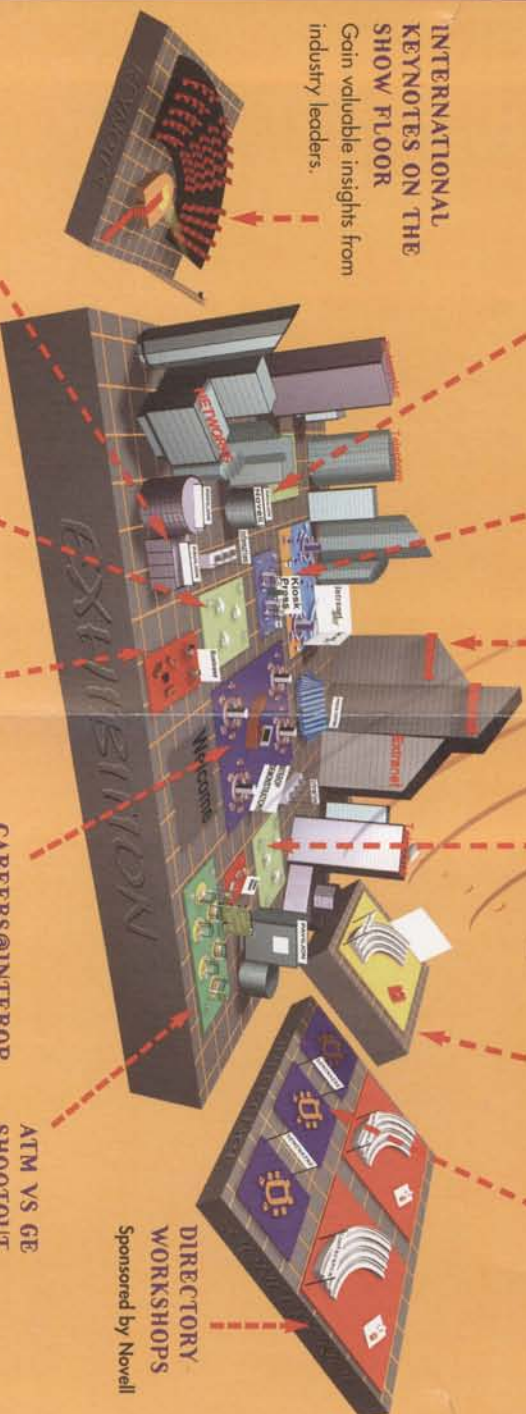
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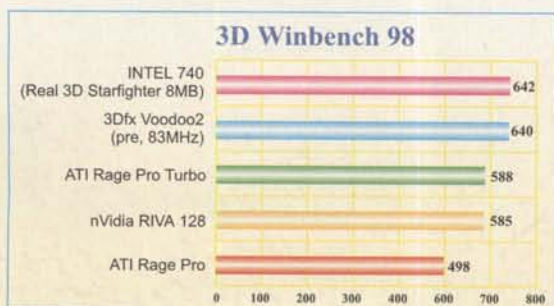
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 - Texture Formats
 - Palletized 1,2,4 or 8 bit
 - RGBA 1555,0565, 4444
 - Texture color keying
 - Texture chroma keying
- Hardware cursor
 - 32x32x2 bpp AND/XOR 2-plane mode
 - 128x128x1 bpp 2-color mode
 - 128x128x1 bpp 1-color and transparency mode
 - 64x64x2 bpp 3-color and transparency mode
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 - 64x64x2 bpp 4-color mode
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 - DVD ROM software decode (optional)
 - Video conference (AG241)



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Total Solution for Multimedia

AG240

types: BMP, BMZ (LZW-compressed BMPs), and JPEG. You also can incorporate sounds and AVI movies.

Once you've created the project, you can build the screen saver for distribution. A Wizard helps you create a setup program that can include a license agreement, Read.me file or advertising banner to go with the program.

You even can insert an expiration date, or use push technology to download a new version of your screen saver whenever you have new content. Stardust's Screen Saver Toolkit offers professional-level features in a package that's friendly enough for neophytes.

Screen Saver Toolkit, v2.1. Stardust Software; www.stardustsoftware.com/ss toolkit.

System Utilities

Take Command/32

The winner in the System Utilities category is Take Command/32, a 32-bit Windows version of the company's popular command processor replacement, 4DOS. Take Command includes all the features of 4DOS plus some graphical extras such as a scrollbar

PC Magazine Finalists: 1998 Ziff-Davis ShareWare Awards

Listed below are the 60 finalists in the 12 categories judged by PC Magazine. The winner in each category appears in bold type.

APPLICATIONS

As-Easy-As	Trius Inc.
Gator Edit	Dangerous Cybernetics
NoteTab Pro	Eric G. V. Fookes
UCalc	Daniel Corbier
UnitStar	Tao Yue

BUSINESS

Adarus Business Plan	Adarus Software
Atrex32	Millenium Software
Expense Report 98	Zoom Systems
Power UtilityPak 97	JWalk & Associates
SyTools 32	AnvorySoft

COMMUNICATIONS AND NETWORKING

CU-SeeMe	White Pine Software Inc.
OmniHTTPd	Omnicon Technologies Corp.
NT Command Line Security Utilities	Keith Woodard
WinProxy	Ositis Software
WinTel32	SMSoft

DESKTOP ACCESSORIES

Aboriginal Art Screen Saver	Image Factory Software
DiaLog32	Wolfgang John
GeoClock	J. H. Algren
Judy's TenKey	Judy's Applications
LaserUp! Simple Calculator	LaserUp! Software

E-MAIL, NEWS READERS, CHAT

Gravity 2.0	MicroPlanet Inc.
ICQ	Mirabilis
NewsBin	SWAT Consulting
NewsMonger	TechSmith Corp.
Spam Exterminator	Unisyn Software LLC

FILE UTILITIES

Drag and View	Canyon Software
TidyDisk	American Systems
TurboBrowser98	PacificGold Coast Corp.
TurboZip 97	Pacific Gold Coast Corp.
WinZip	Nico Mak Computing

GRAPHICS AND MULTIMEDIA

ACDSee	ACD Systems Inc.
Jet Audio	Cowon Systems Inc.
MyFonts	UniTech/MyTools.com
Screen Saver Toolkit	Stardust Software
Symmetrca	Software Engineering Inc.

HTML EDITORS

Alchemica Webworks	Alchemica Webworks
CoolCat	Anawave Software
HomeSite	Allaire Corp.
WebEdit PRO	Luckman Interactive Inc.
WebScripter	Code Generation

INTERNET UTILITIES

Copernic	Agents Technologies Corp.
FlexSite 32	Lincoln Beach Software
Opera	Opera Software
WebFerret	FerretSoft
WS_FTP	Ipswitch Inc.

PROGRAMMING TOOLS

ActiveState Perl	ActiveState Tool Corp.
4NT	JP Software Inc.
Java Perk	MeWeb Software
Setup Specialist	TG Byte Software
Windows Help Designer	Nick Ameladiotis

SYSTEM UTILITIES

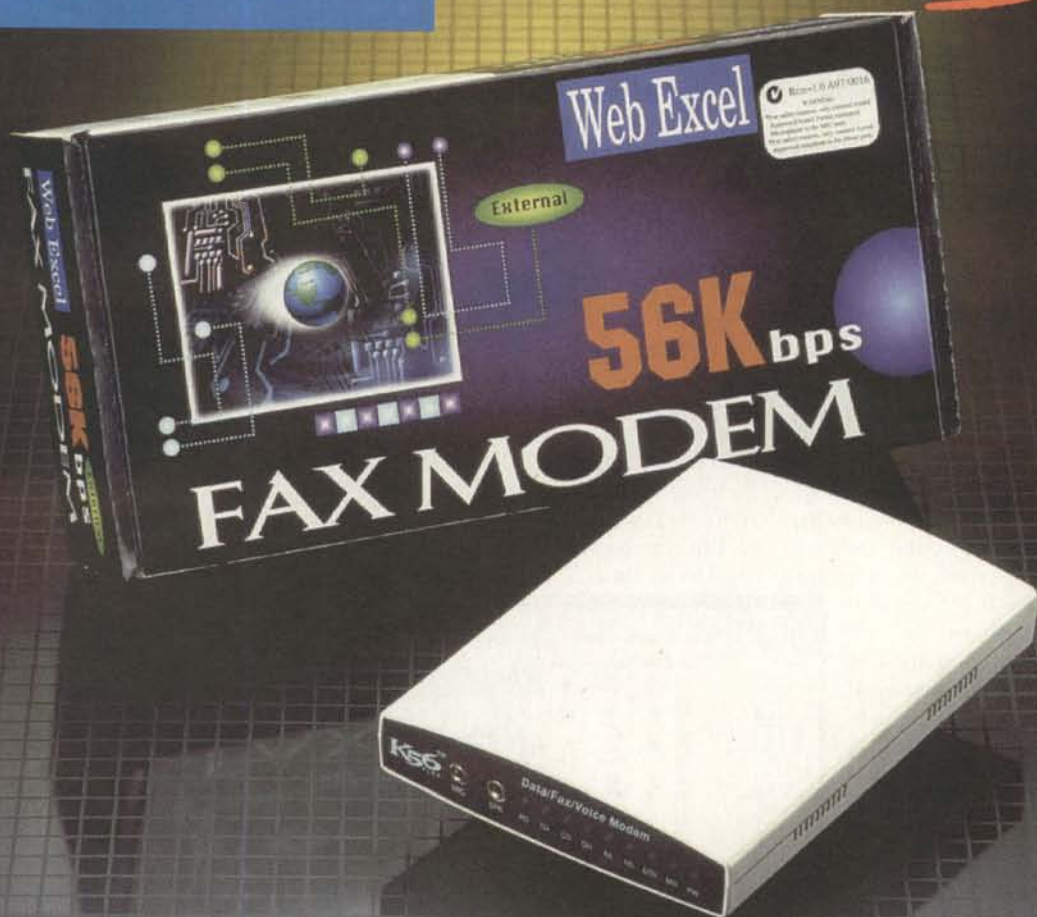
CD-Quick Cache	Circuit Systems
EZMacros	American Systems
RegRepair	Easy Desk Software
SmartBoard	Oakley Data Services
Take Command/32	JP Software Inc.

WEB DEVELOPMENT

Cool Button Tool	Formula Software
GDIdb	GlobalData Industries
Net-It Now!	Net-It Software Corp.
RiadaCartel	Riada International
Swami	Sausage Software

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- SAVD (Audio SPAN/Simultaneous Audio Voice Data)
- Full Duplex Speaker Phone (FDSP)
- Voice View Alternating Voice/Data
- Voice/Silence Detection and Handset Echo Cancellation for SAVD and DSVD
- Rockwell Video Mode (VRPI) V.80 supported

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SCREEN SAVER TOOLKIT lets you preview images.

A "Caveman" feature lets you run character-mode applications with scrolling output (for example, PKZip or XCOPY) directly within the Take Command window.

Small touches like colour coding by file type make it easier to read a directory listing. New with Version 3 is the ability to launch a program by typing an associated document name on the command line. Aliases let you create new commands that correspond to sequences of several commands. You can also associate short command sequences with toolbar buttons. So with a single button click, you can switch to a default directory and enter a command for program execution.

Take Command offers many conveniences, but its most powerful tool is its batch language. You can obtain information about the system; manipulate strings, numbers, and dates; interact with the clipboard; and much more. This latest version includes a batch-file debugger that lets you single-step through a batch file line-by-line. Like 4DOS before it, Take Command is a must-have for power users.

Take Command/32, v3.01. JP Software; www.jpsoft.com.



TAKECOMMAND displays output from console apps.

all the features of Windows Explorer and adds many more. It has a tree view of folders and a list view of files, but you can arrange these floating, docking panels any way you wish. A search bar lets you quickly find files

buffer, a cus- to m i s a b l e tool bar and access to common c o m m a n d s through p u l l - d o w n menus.

The unique QBar lets you queue files for viewing, printing, graphics conversion, zipping or export. For example, you can drag files from various locations on disk to the ExportQ button, then click the button to copy them to a new location. You can copy or move file lists from one QButton to another, and you can even define new QButtons.

If you like viewing folders as Web pages or using the new Thumbnail view, stick with Windows Explorer.

But if you use your Windows shell as a tool to locate and launch programs, Turbo

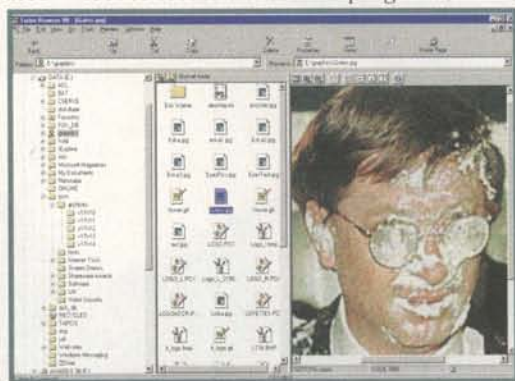
Browser by file type, and you can print out file lists.

Turbo Browser supports many file formats. Click on any file and a powerful preview feature will display its contents. You can view multiple preview windows at once, and you can print files from within the preview window.

The unique QBar lets you queue files for viewing, printing, graphics conversion, zipping or export. For example, you can drag files from various locations on disk to the ExportQ button, then click the button to copy them to a new location. You can copy or move file lists from one QButton to another, and you can even define new QButtons.

If you like viewing folders as Web pages or using the new Thumbnail view, stick with Windows Explorer.

But if you use your Windows shell as a tool to locate and launch programs, Turbo



TURBO BROWSER'S built-in viewer recognises a multitude of formats.

Browser 98 will serve you better.

Turbo Browser 98, v6.01. Pacific Gold Coast; www.turbozip.com.

Communications and Networking

WinProxy

WinProxy is a secure firewall proxy server for Windows 95 and Windows NT. It hides your PC from outsiders on the Internet. Networked PCs can use WinProxy to share one Internet connection. DNS and HTTP caching reduce access time to frequently visited sites, even when many people are sharing a single, physical connection.

WinProxy supports numerous protocols, including HTTP, NNTP, FTP, DNS, TELNET, POP3, IMAP4, RealAudio, America Online and Socks 4 and 5. This broad support makes access through the firewall trans-

parent, as though your PC were directly connected to the Internet.

Security features let you prevent or restrict access to the Internet based on an IP address. For each IP address, you can specify permitted protocols and enter a unique mail server. Logging features let you monitor access.

WinProxy takes just minutes to set up and is especially useful for sharing dial-up or ISDN Internet connections across small networks. **WinProxy, v2.1.** Osis Software; www.ositis.com.

Internet Utilities

WS_FTP Pro

With Version 5, WS_FTP Pro enters the modern age with a new interface that seamlessly integrates with Explorer.

WS_FTP Pro appears as an Explorer node that expands to display several preconfigured FTP sites and can now perform remote-to-remote file transfers.

WS_FTP also supports passive transfers, automatic re-get of failed transfers and numerous types of firewalls. It can preserve the file time on transfers from remote servers, append downloaded files, and prompt you before overwriting newer files. You can set the number of connection retries and the network time-out, and apply filters to remote directories.

WS_FTP Pro's command line syntax lets you connect to a remote site, transfer files, and then disconnect, allowing you to schedule transfers for off-hours with a utility such as System Agent. You can schedule multiple transfers by entering the commands in a text file.

If you spend a lot of time transferring files to and from remote sites, you'll appreciate the flexibility and power of WS_FTP Pro.

WS_FTP Pro, v5.00T 98.04.09. Ipswitch; www.ipswitch.com.



THE MAIN WINDOW shows all connections to the server.



YOU GET two interface options: Classic and Explorer.

PC 98: More Powerful and Friendlier Hardware

Microsoft and Intel's new design guide for PC system hardware ups the multimedia ante.

By Neil Randall

From the standpoint of system capabilities and hardware requirements, DOS was a fairly undemanding platform. Certain programs required add-ons, but for text-based programs like early versions of WordPerfect, Lotus 1-2-3 or dBase, a relatively bare-bones system was fine. Then came Windows 3.0, and the world changed. Suddenly, computers needed more memory, more powerful graphics capabilities, better sound and music hardware, and, in general, more support for more devices.

In 1990, a consortium of hardware and software companies calling itself the Multimedia PC Marketing Council released a set of guidelines for PC manufacturers to follow in designing and building PCs. Those whose systems satisfied the specifications were allowed to place the MPC logo on their machines as an indication to consumers that the machines would let them run multimedia-based products designed for Windows. The guidelines became known as the Level 1 MPC (multimedia PC) specifications and were followed in 1993 by the Level 2 MPC specs.

In the computer world, of course, 1993 is ages ago, and a great deal has happened to the PC since then. Multimedia demands are much

higher, programs require more powerful hardware than ever, and new devices need special resources. Users expect their computers to do far more than ever before, right out of the box, and they want to be able to add equipment and resources to their machines effortlessly. That's a tall order, given the huge range of equipment available to the PC buyer.

THE PC 98 SYSTEM DESIGN GUIDE

Microsoft and Intel (with input from other companies) have teamed up to produce guidelines called the PC xx specifications (xx represents the year to which they apply). The *PC 97 Hardware Design Guide* was released in 1996, and early this year the two companies coauthored the *PC 98 System Design Guide*, with Compaq and others chipping in. This guide, combined with the first drafts of the PC 99 specifications, gives you a good sense of what kind of system you'll need to keep up with the newest trends in software and hardware.

These guidelines are the basis of testing by Windows Hardware Quality Labs (WHQL), and hardware that passes testing by this organisation can be labelled with the "Designed for Microsoft Windows" logo. The guidelines describe some features as required and others

as recommended. To be eligible for the logo, a machine must support all required features. Any recommended feature a manufacturer chooses to include must meet the requirements defined in the guide.

The PC 98 specifications are available for download from the Web at www.microsoft.com/hwdev/pc98.htm. The PC 99 guidelines, currently in draft format, are accessible through <http://developer.intel.com/design/desguide>.

The PC 98 design guide differentiates among several types of PCs, according to how the systems are intended to be used. The main systems are the Consumer PC 98, the Office PC 98, and the Entertainment PC 98 (see Figure 1 for special requirements and recommendations for these classes). We'll examine them here, in addition to the Workstation PC 98. The design guide also includes the Mobile PC 98, but we won't have time to look at that here.

PHYSICAL DESIGN

PC 98 stipulates several requirements and recommendations for the physical design of a system. One aspect concerns audible sound produced by a machine. PC 98 requires a machine to be virtually silent when in sleep mode (see the ACPI and OnNow initiatives, described below). The guidelines also encourage manufacturers to limit fan noise as much as possible relative to the size of the system box.

Accessibility is another topic addressed by the guidelines. An entire appendix of the design guide is devoted to making systems accessible to people with disabilities—specifically visual, auditory and cognitive, along with speech impairments and seizure disorders. The accessibility of internal components is also covered. Happily, all expansion slots must be accessible to users, al-

DIFFERENCES AMONG PC 98 SYSTEMS

Feature	CONSUMER PC 98 Required	Recommended	OFFICE PC 98 Required	Recommended	ENTERTAINMENT PC 98 Required	Recommended
SystemBus	USB, PCI, no ISA devices	IEEE 1394 port	USB, PCI, no ISA devices	IEEE 1394 port	No ISA, 2 easily accessible USB ports and 2 IEEE 1394 ports (one easily accessible)	Device bay
Graphics	Hardware for 2-D acceleration, 3-D driver support	Hardware for 3-D acceleration, AGP	3-D acceleration driver support	Hardware for 2-D and 3-D acceleration, AGP	Hardware for 2-D and 3-D acceleration, AGP	Large-screen monitor
Video	Basic PC 98 minimum	TV tuner, TV output	Basic PC 98 minimum	DVD-Video and MPEG-2 playback, TV tuner, TV output, video port	DVD-Video and MPEG-2 playback, video input, video capture, TV tuner	TV output, digital or satellite TV tuner
Audio	None	PC 98 audio, music synthesis support	None	PC 98 audio	PC 98 audio, support for 3-D audio and music synthesis	Digital ready
Communications	Internal 33.6-Kbps V.34 modem	High-speed dial-up device using NDIS 5.0 specs	Network adapter with NDIS 5.0 driver	Internal 33.6-Kbps V.34 modem or other high-speed dial-up device	Internal PCM modem	High-speed dial-up device with NDIS 5.0 specs
Storage	8X CD-ROM	DVD-ROM with DVD-Video playback	Basic PC 98 minimum	8X CD-ROM	DVD-ROM drive with DVD-Video playback	External IDE drives use IEEE 1394 port
I/O Devices	Basic PC 98 minimum	USB game pad, remote-control device	Basic PC 98 minimum	Use of external buses for devices	Game controller, all devices HID compliant and connected via external bus	Remote control

though manufacturers can configure the physical space inside the box to allow half-height cards and other physical oddities. The PC 98 spec recommends that manufacturers prevent users from gaining access to the system components, thus precluding end-user upgrades of the CPU, RAM or the motherboard. This is a recommendation for both office and consumer PCs, but preventing upgrade access in a consumer machine might be a bad design decision all around.

The PC 98 specs call for all systems to have specific I/O capabilities. All systems require a keyboard (rather unsurprisingly), connectable to the machine via a PS/2 port or a USB (Universal Serial Bus) port. USB is recommended for consumer and office PCs; a USB or wireless keyboard connection is required with entertainment PCs. A pointing device is also mandatory, and a serial port is not an acceptable mouse port for PC 98 machines. Infrared Data Association (IrDA) wireless capabilities are recommended for all PC 98 machines but are not required in any.

HARDWARE AND POWER MANAGEMENT

As you might expect, the PC 98 specs set minimum hardware requirements. The processor must be at least a 200MHz Pentium with MMX or an equivalent, and the system must have 32MB of RAM, with 64MB recommended. Furthermore, no more than 4MB of that RAM can be inaccessible to the OS, even if a peripheral requests more. Finally, a 256K Level 2 cache is required.

Power management is covered in considerable detail. All PC 98 motherboards must include support for the Advanced Configuration and Power Interface Specification (ACPI) 1.0. That support is considered so important that the specs prohibit the system's CMOS from providing facilities for disabling it. For compliance with ACPI, both a power button and a sleep button are recommended, and one or the other is required. PC 98 also requires an alarm that will wake the PC at a specific time and on a specific day of the month. The system must support the S5 sleep state as well as one of the S1, S2 or S3 states, and the USB controller must be able to wake the system from one of these states. You can find ACPI information at www.teleport.com/~acpi.

Power management also appears in the required hardware support for the OnNow design initiative, whose goal is to provide specifications for manufacturers to produce hardware that makes a PC appear to be turned off when in reality it is always on and ready for user input. Ideally, a PC would be instantly available without a long boot-up sequence, yet the machine wouldn't use any ap-

preciable power when not in use. You would never have to turn your machine off; it would be ready to receive faxes, dial out for automatic downloads, perform system maintenance, and respond when you touch an input device. When a system designed to PC 98 specs is asleep, it must make no noise (including fan noise) and show no visible sign of power beyond a small status indicator, which must show whether the PC is working, asleep, or asleep according to BIOS settings rather than OnNow settings. Users must be able to adjust the settings easily through software.

The PC's BIOS must also support the OnNow initiative by limiting the number of tests performed by the PC at boot time. The specs recommend a series of possible time-savers, including eliminating, limiting or making optional the tests for floppy disk drives, hard disk types, hard disk controller, system RAM, video RAM, and serial and parallel ports. The BIOS has only five seconds to pass the system over to the OS. The BIOS must also

The PC 98 specifications do not eliminate the ISA expansion bus—they specify that a new PC 98 system may not include ISA expansion devices.

contain support for booting from a CD-ROM and for the correct implementation of Year 2000 dates.

ACPI is concerned with more than just power management. It also assists with Plug and Play (PnP), the hardware-recognition initiative that began with Windows 95 and is more fully supported in Windows 98. The PC 98 specs demand PnP throughout a system's design. ACPI works with the device information in the BIOS to allow PnP to operate more smoothly than before. PnP and power management are also a goal of the Win32 Driver Model (WDM), which lets developers use the same device drivers with only small changes for both Windows 98 and Windows NT 5.0, eliminating many of the driver deficiencies of Windows NT 4.0.

SYSTEM BUSES AND PERIPHERAL DEVICES

Despite what you may have read, the PC 98 specifications do not eliminate the ISA expansion bus. They do, however, specify that a new PC 98 system may not include any ISA expansion devices. The idea is to get rid of the

slow ISA protocol entirely, but obviously that isn't going to happen overnight. So even though the system can't ship with any, you can add your old ISA devices to your system. The Entertainment PC 98 specs require that no ISA slots be accessible to end users at all.

All PC 98 systems must include at least one USB port, two for the Entertainment PC. The USB port must be capable of waking your system from its sleep state, so that a USB-connected fax modem, for example, will bring the system back to life when a fax comes in. USB is a hot topic in the PC 98 literature, mainly because devices can be attached and detached without powering down. Pull out the scanner cable and plug in the joystick, and the machine not only won't freeze, it will instantly recognise the device you've attached. It's about time!

One point of particular interest is that under the PC 98 specs the PC is no longer considered a standalone machine. All flavours of PC 98 computers must ship with a communications device—a modem for the consumer and entertainment versions and a network adaptor for the office variety. The modem need be only 33.6kbps with the 1996 V.34 standard, but its mandatory inclusion should guarantee a horde of new Internet users over the next several months. Installing and configuring modems, after all, has been a huge thorn in the PC user's side and has undoubtedly prevented many people from even trying to access the Internet.

Video cards for a PC 98 system must be designed according to the PCI 2.1 or AGP 1.0 specifications, with AGP required for entertainment machines, at resolutions ranging from 640 x 480 to 1024 x 768. They must also support multiple-monitor configurations, and the PC 98 specs also recommend support for display on an NTSC- or PAL-based television. All consumer and entertainment PC 98 machines require support for DVD video and MPEG-2 playback, and even notebooks are recommended to provide this support. Entertainment systems must be capable of video capture and analogue video input and must come equipped with a TV tuner; those features are recommended on the other PC 98 systems.

ENTERTAINMENT AND WORKSTATION PCs

Because of their emphasis on multimedia and games, entertainment PCs have some special requirements. No ISA expansion is allowed at all—not even ISA slots on the motherboard. All input devices, including everything from keyboards to game controllers, must be designed according to the USB Device Class Definition for Human Interface Devices (USB HID) specifications, so that devices can be easily attached and unplugged without the need to power the machine down. Game controllers

in a PC 98 system have to support the use of four devices simultaneously, something that has been easy with game consoles such as the Nintendo 64, but hopelessly difficult in PCs.

Two USB ports are required, one of which must be easily accessible, which means it must not be on the back panel, and two IEEE 1394 ports, one of which must be easily accessible. The IEEE 1394 standards outline a fast serial bus—up to 400Mbps—suitable for connecting devices such as removable storage devices and multimedia (audio/video) devices. Multimedia requirements are extensive in the entertainment PC, with required support for both digital (DTV) and analogue television (NTSC or PAL) input and output, video input and capture, and MPEG-2 playback. The machine must include a DVD drive with DVD video and an AGP-based 3D graphics adaptor.

The PC 98 specifications don't apply only to Windows 98 machines; a special section of the design guide focuses on systems running Windows NT Workstation 4.0 (and 5.0, when it is available). A Workstation PC 98 requires a higher-end CPU than other PC 98 machines, specifically a Pentium Pro or Pentium II, and at least 64MB of RAM (per processor with multiple CPUs, which the machine is required to support) that can be upgraded up to a gigabyte. Also required is a 512KB Level 2 cache (per processor), double the amount for the other PC 98 designs. Hard disks and other storage devices are recommended to be SCSI-based, as are multiple hard disks, so the workstation can be configured for RAID data protection.

THE WRAP

The PC 98 specifications have multiple purposes. First, they force PC manufacturers to design machines that take advantage of the latest hardware and software technologies. For consumers, that means a more capable computer, and for the computer industry, sales of new products. Second, they make PCs more comprehensive and more able to handle new applications. The idea is to move the PC further away from its roots as a text-based tool toward its perceived future as a multimedia-rich business and entertainment device.

Finally, the specs force greater ease of use to go along with increased capability. Gone at last will be the pain of manually configuring peripheral boards, powering down the machine to plug in something as simple as a joystick, and finding out your new software won't run because your computer is missing some fundamental hardware. Why should users have to do any configuring, after all? Let the hardware look after itself. ■

Maintaining Your Windows 98 System

A set of very useful tools in Windows 98 will help you keep your system functioning at its peak.

By Neil Randall

Everyone who owns a car knows the importance of regular maintenance: without this attention, the thing will let you down at the most inopportune moment. But most of us don't bother maintaining our computers. Sure, we know that hard disks should be checked for errors and defragmented for better performance, directories filled with temporary files should be pruned, and data should be backed up, but that's time-consuming and inconvenient.

For those who think that way, and for those who have no idea what computer maintenance entails, Windows 98 offers a set of maintenance tools. The idea behind some of these tools is to keep your system functioning at peak performance, or at least close. Other utilities let you configure your system to ensure that only necessary files load during the boot sequence. Used together, these maintenance tools can make a significant difference in how efficiently and reliably your system will work.

We'll begin by exploring the maintenance tools packed inside Windows 98's Maintenance Wizard, then take a look at the System Configuration Utility. Both are integral to maintaining your system.

MAINTENANCE WIZARD

The Maintenance Wizard doesn't do a great deal by itself. Instead, its function is to help you organise three maintenance procedures: checking the hard disk for errors, deleting unnecessary files, and defragmenting the disk. Each procedure falls under the auspices of a different system utility—ScanDisk, Disk Cleanup and Disk Defragmenter, respectively—and the Maintenance Wizard lets you set a schedule for running them automatically. You can access and schedule each utility separately. All are available via the System Tools folder in Accessories, as is the wizard itself.

The wizard lets you choose between Express and Custom settings, and we'll assume that if you're reading an article like this, you're probably the sort to choose Custom. The first step is to decide when to schedule the maintenance tools to run automatically.

The default is between midnight and 3:00 A.M. local time (make sure your system's time settings are correct), but you can specify days, evenings or custom settings as well.

One feature of the wizard that doesn't appear in its three main utilities (although the feature is available in the System Configuration utility) is the ability to speed the boot process by preventing programs in the StartUp folder from loading. The second step in the wizard displays all the executables in the StartUp folder with a check box beside each one. The first time you run the wizard, all the programs are checked. By unchecking a program, you stop it from loading when Windows starts up. This is much easier and more useful than opening the StartUp folder and deleting program icons (the usual way of preventing automatic starting of programs), especially since the icons remain in the folder and can be reactivated by running the Maintenance Wizard again. If you work with the StartUp folder directly, the only way to reactivate automatic start is to re-create the icon in that folder.

The wizard lets you customise the three system utilities designed for maintenance: Disk Defragmenter (which, as Figure 1 shows, the wizard calls "Speed Up Programs"), ScanDisk ("Scan Hard Disk for Errors"), and Disk Cleanup ("Delete Unnecessary Files"). We'll deal with each of these below. The wizard concludes with a summary of your settings for the three utilities and includes a check box, unchecked by default, to run the utilities when you click *Finish*. The next time you load the Maintenance Wizard manually, you'll be prompted to perform maintenance immediately or to change your settings. In the latter case, the wizard repeats the above sequence.

SCAN HARD DISK FOR ERRORS: SCANDISK

ScanDisk is no stranger to PC users, and Windows 98 follows Windows 95 in providing versions for DOS as well. ScanDisk's purpose is to attempt to detect and fix errors on your hard disk. It can detect problems with the file system—the Windows 98 version of ScanDisk supports drives formatted with FAT32 in addition to FAT16—and it can determine errors in

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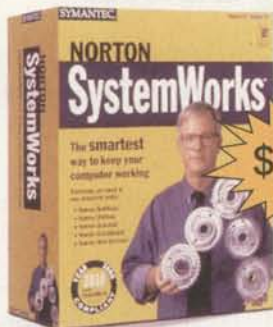
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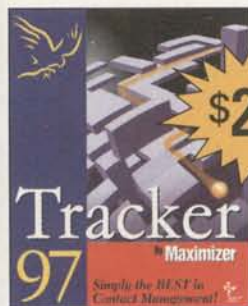
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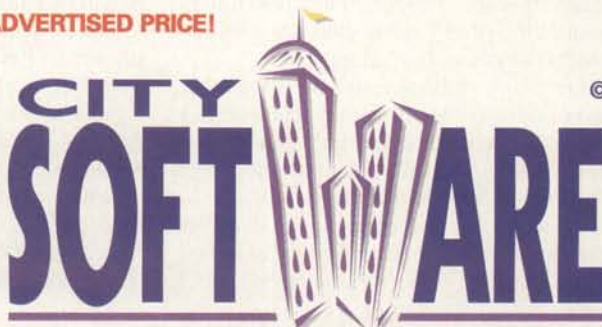


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long filenames. It examines the directory structure of the disk for errors, and it checks for problems in the file system structure, looking for cross-linked files and lost clusters, and lets you decide whether or not to repair them. It will also perform an exhaustive analysis of the physical surface of the disk, isolating bad sectors and offering to move data from those sectors to an area of the disk where the sectors are operational. Naturally, ScanDisk cannot be used on CD-ROMs, but it does work with disks that are compressed using DoubleSpace or DriveSpace.

You can schedule ScanDisk, either through the Maintenance Wizard or with the Scheduled Tasks wizard (found in *Start / Programs / Accessories / System Tools*), to run automatically on a periodic basis. If you use Maintenance Wizard to do this scheduling, ScanDisk will run with its most common settings, including automatic fixing of errors (instead of a dialog offering you choices). ScanDisk will also run automatically if you shut down Windows without using the *Shut Down* command in the *Start* menu, a procedure Microsoft introduced with Internet Explorer 4. Unlike the earlier version, Windows 98 starts this ScanDisk operation in automatic repair mode, eliminating the need for interaction if errors are found.

Forcing you to consider establishing an automatic schedule is one of the Maintenance Wizard's primary functions. Ideally, you should run ScanDisk once a week, but in the real world almost nobody does. In fact, many people never launch ScanDisk, even those who should know better (systems professionals and computer journalists, for example), and as a result are playing fast and loose with possible disk errors. ScanDisk is an important part of Windows 98 maintenance.

SPEED UP PROGRAMS: DISK DEFRAGMENTER

Hard disks hold data in clusters. A cluster can be no larger than 32K, which means many files need more than one cluster for storage. Larger files, such as data files from office and multimedia applications and the files that constitute programs themselves, get stored on multiple clusters of the disk. Ideally, these individual and related files are stored on contiguous clusters, because then the PC has to spend the least possible time locating their components.

Over time, however, as you accumulate more and more files and as current files are increased or decreased in size, individual and related files become spread across noncontiguous clusters. That in itself is not bad for the files—their integrity does not suffer—but loading them into memory takes more time. Por-

tions of an individual file or a collection of related files can be scattered all over the disk, and to load them the computer must locate and read each portion in turn. This takes time.

The purpose of Disk Defragmenter in Windows 98, unlike the aim of Windows 95's version, is to bring related files physically closer together, so that disk seeks take less time and files and programs are loaded more quickly. Windows 95's program worked well at collecting the various portions of individual files into contiguous locations, but Windows 98's Disk Defragmenter goes a big step further by collecting multiple files for entire programs into contiguous locations. When a program launches, the EXE and related DLL files are loaded into memory, but not all at once, and not in sequential order. Disk Defragmenter places a program's files not only on contiguous clusters, but in the order in which the program will need them. In addition, Windows 98 tracks your program usage and uses that information to move your most frequently used programs to the most speedily accessible areas of the disk. The result is that the programs you use most often

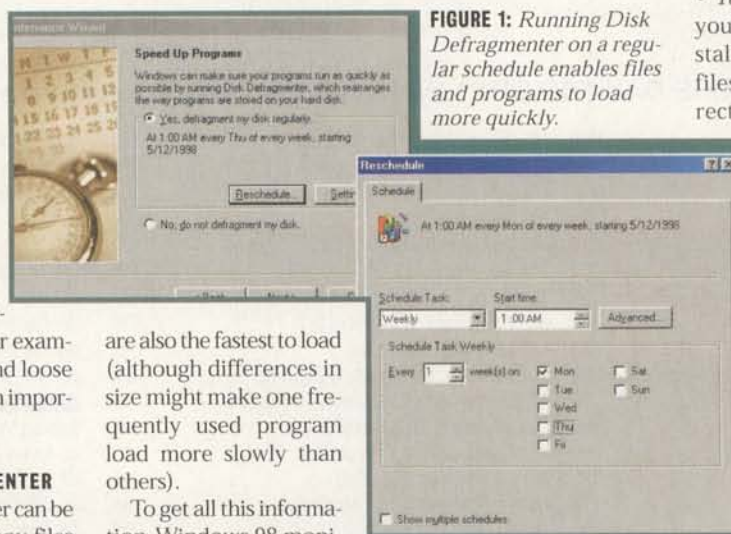


FIGURE 1: Running Disk Defragmenter on a regular schedule enables files and programs to load more quickly.

are also the fastest to load (although differences in size might make one frequently used program load more slowly than others).

To get all this information, Windows 98 monitors the loading of programs through a utility called Task Monitor, which records how each program accesses the disk in a series of log files stored in the *Windows\Applog* directory. The log file for PowerPoint, for example, would be named *PowerPoint.lgx*, with *x* denoting the letter of the drive on which the application is stored. There you'll find the names and disk locations of the files PowerPoint reads when loading. You can read the files using Notepad, as you can also read *Optlog.txt*, another file in the *Applog* directory, which contains a listing of the programs Disk Defragmenter will attempt to optimise next time it is run.

DELETE UNNECESSARY FILES: DISK CLEANUP

No matter what you do, Windows 98 will always be a disk hog. But you can cut its appetite for disk space to some degree by manually or automatically running Disk Cleanup every so often—weekly, if you're a heavy Internet user. As with the other utilities, the options for Disk Cleanup are more complete in the standalone version than in the Maintenance Wizard, but the idea is the same: automatically deleting a range of files that are not necessary for your system to function. You can launch Disk Cleanup from *Start / Programs / Accessories / System Tools* or by clicking the *Disk Cleanup* button in the *Properties* dialog for the hard disk.

The standalone Disk Cleanup offers three tabs' worth of choices: *Disk Cleanup*, *More Options*, and *Settings*. The Maintenance Wizard offers only the first, but that is the most important of the three. In *Disk Cleanup*, you can select from a variety of files (each with a check box) that you want the utility to delete, either automatically on a periodic basis, or manually whenever you run it. The files include:

- **Temporary setup files.** When you install a program, the installer typically creates setup files in the *Windows\Temp* directory but doesn't usually

clean them out automatically. These files can occupy several megabytes of disk space.

- **Temporary Internet files.** To cut down on the time it takes to load Web documents, Internet Explorer stores copies of previously visited documents and files in a *Temp* directory. Your disk drive can quickly get clogged with them.

- **Downloaded program files.** In the

Windows\Downloaded Program Files folder you'll find Java applets and ActiveX controls that your browser has downloaded from the Web. Even a few Web sessions can produce several megabytes of these files.

- **Recycle Bin.** By default, this option is unchecked, because many people like to keep deleted files in the Recycle Bin so they can restore a deleted file if necessary. But cleaning out the bin once in a while is a useful idea, even if you've set your Recycle Bin to hold only a few megabytes' worth of deleted files.

- **Temporary files.** Many programs create temporary files in the *Temp* directory (Word does this with automatic saves, for example).

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Programs delete these files on exit, but in the case of an improper system shutdown or a program failure, the files remain. Disk Cleanup can delete them.

- **Windows 98 uninstallation information.** When you install Windows 98, you are given the option of saving uninstall information in case you want to revert to your previous Windows version. These files occupy 50MB to 100MB of disk space, and you can use Disk Cleanup to get rid of them if you wish. Be aware, however, that you can no longer revert to your earlier version of Windows once you do.

The standalone Disk Cleanup offers additional possibilities. The *More Options* tab gives you access to the Add/Remove Programs utility in Control Panel. You can delete Windows components you don't use (do you really need all those multimedia files and desktop themes?) and installed programs that you no longer need. In addition, this tab gives you the option of converting your FAT16 file system to FAT32, which decreases the disk space wasted from partially used clusters. Savings here can be considerable, but bear in mind that partitions formatted with FAT32 are available only to Windows 98 and Windows 95 OSR2. The original Windows 95 cannot access them, nor can Windows NT 4 or DOS, Versions 7 and under. And once you convert a disk from FAT16 to FAT32, you can't change it back to FAT16 without a full reformat (and thus the loss of all data).

The *Settings* tab lets you specify that you want Disk Cleanup to run automatically if you start running out of space on your hard disk. "Running out of space" means different things depending on the size of your disk, but here it means you're down to between 1 and 1.5 percent of the total space. Disk Cleanup will start this way a maximum of once each Windows session (and only if space becomes that limited), and it presents you with a list of delete options.

THE SYSTEM CONFIGURATION UTILITY

Accessed through the *Tools* menu of the System Information utility (*Start | Programs | Accessories | System Tools | System Infor-*

mation), the System Configuration Utility gives you control over the operating system's start-up procedure. Each of the utility's six tabs lets you control a different element of start-up. You can specify how you want Windows to load, so you can reduce the time taken for start-up by eliminating certain drivers and programs from being loaded into memory. This process is better than editing the actual files, because the elements remain in the files and can be activated by revisiting the utility.

The *Config.sys* and *Autoexec.bat* tabs give you access to these DOS start-up files. Each line in those files is given a check box, and you can uncheck any lines you want to exclude from the boot process. You can also add new lines and edit existing lines through this dialog.

The *System.ini* and *Win.ini* tabs work much the same way, allowing you to uncheck the elements you don't want to load at start-up. Headings, such as [Fonts], have expandable and collapsible menus, so that you can work as deeply inside the INI file as you wish. Again, you can add new lines or edit existing ones.

start-up, with all software and drivers loading—the typical way to boot Windows—or a diagnostic start-up, in which Windows 98 gives you the choice of loading or not loading each program and driver in the start-up sequence. You can also choose *Selective Startup*, checking any number of options. These include processing *Config.sys*, *Autoexec.bat*, *System.ini*, *Win.ini*, and the items in the StartUp group. By not processing *Autoexec.bat*, for example, you can determine whether you really need that ancient DOS program in your configuration. If not, select the *Autoexec.bat* dialog and disable it.

The *Advanced* button in the *General* tab gives you access to more start-up procedures. Here you can force the *Startup* menu to appear, and you can stop ScanDisk from running after an improper shutdown. You can force a 640 x 480 display at your next start-up, and you can disable Windows 98's fast shutdown (in which drivers are not unloaded from the system). The purpose of some of these options is to improve system performance, but in most cases the purpose is troubleshooting. In the case of preventing

ScanDisk from starting automatically after a bad shutdown, the purpose is to improve boot speed—but at the risk of having improper files on your disk.

For further customisation, optimisation, and troubleshooting, the *View* menu of the System Configuration Utility gives you access to the Control Panel and Device Manager, the Printers and Fonts folders, and the *Display Settings* and *Multimedia Settings* dialogs.

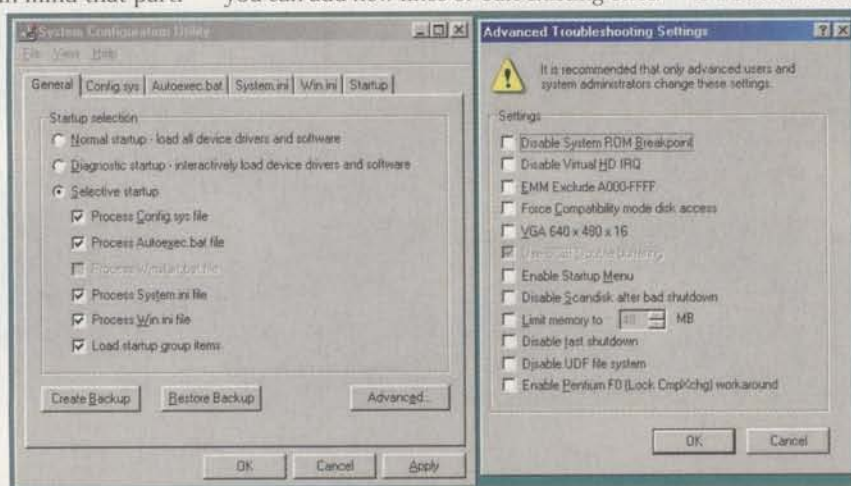


FIGURE 2: Using the System Configuration Utility to modify your start-up sequence, you can make Windows 98 run more efficiently by eliminating unnecessary programs and procedures.

The *Startup* tab lists all the programs and processes that load with Windows from the registry and the StartUp folder. Included here are such items as LoadPowerProfile (for power management), TaskMonitor (see Disk Defragmenter above), SystemTray and SchedulingAgent. You can check or uncheck any of these, but you can't add or remove the elements themselves.

The most complex area of the System Configuration Utility is the *General* tab (Figure 2). Essentially, this dialog reproduces the *Startup* menu accessible by pressing the F8 key while Windows is booting. You can specify a normal

From the standpoint of system maintenance, the Maintenance Wizard and the System Configuration Utility differentiate Windows 98 from Windows 95. Third-party software makers have provided similar utilities in the past and will certainly offer more comprehensive variants on these utilities specifically designed for Windows 98; but having them as part of the basic package is obviously useful and probably necessary as the Windows environment gets even more complex. System maintenance is never much fun, but it's necessary, and now we have very few excuses not to perform it. ■

THE WRAP UP

Ask Our Advisors

Manage Toolbars in Win 98

To create an extra toolbar in Windows 98 (or Windows 95 with Internet Explorer 4), drag either My Computer, Network Neighborhood, or Recycle Bin to the edge of the screen. The mouse pointer has to touch the border. When you release the mouse, a new toolbar will be created, and you can modify it or move it to another place.

BERNARDO PEREZ
via the Internet



FIGURE 1: Windows 98's toolbars provide a new way to launch programs.

PC MAGAZINE: Under Windows 95, you already have a choice of launching programs from the Start menu or from shortcut icons on the desktop. Now, with Microsoft's Active Desktop (available in Windows 98, Windows NT 5, and Internet Explorer 4), the desktop can be replaced by a Web page. When the desktop is a Web page, the desktop icons become a distraction, and by default they're not displayed. To make up for the loss of the desktop as a program launching pad, Microsoft introduced user-configurable toolbars.

A system with Active Desktop installed displays a Quick Launch toolbar on the taskbar, just to the right of the Start button. From this toolbar you can launch IE4, launch Outlook Express, view Active Channels and quickly minimise or restore all programs on the desktop. You can enable three other optional toolbars by right-clicking the taskbar, choosing *Properties*, clicking *Toolbars* and then checking off *Address*, *Links* or *Desktop*. The Desktop toolbar displays the icons from your desktop, and the Links and Address toolbars duplicate their namesakes within Internet Explorer.

To create a new toolbar via the menu, however, you have to right-click the taskbar, click *Toolbars*, click *New toolbar*, and navigate to an existing directory, preferably one that contains only shortcuts. The drag-to-the-edge method described above is much simpler, and you can use it with any folder, not just My Computer, Network Neighborhood and Recycle Bin. For example, right-click the Start menu, choose *Explore*, open the Programs folder, and open the Accessories folder within it. Now drag the System Tools folder to any edge of the desktop or onto the taskbar, and release the folder. You've created an instant toolbar of system tools.

As Figure 1 shows, if you activate very many toolbars, you'll have to increase the height of your taskbar substantially. You can save some space by carefully setting the properties of your toolbars. Right-click each toolbar's title or left end, choose *View* from the pop-up menu, and make sure *Small* is checked. Remove the check marks next to *Show Text* and *Show Title*. You've now reduced the toolbar to a bare minimum, showing nothing but icons. If you forget what a particular icon represents, rest the mouse over

the icon and its title will appear in a ToolTip.

A Good, Swift Boot?

My system came with a SCSI adaptor with only an internal connector, for the internal Jaz drive. I then purchased a flatbed scanner that came with its own SCSI adaptor, which had only an external connector. Unfortunately, I didn't have any IRQs left for the new card, so I decided to replace the two with a single card that has both internal and external connectors. The one I'm considering has two models; one is bootable, the other is not. I use my IDE hard disk as my boot disk, so I wonder if there is any reason why I should spend the extra money for the bootable SCSI adaptor. Is there a good reason that I'm missing? Would the bootability mean that I could turn on the scanner after booting the computer? (Currently the scanner has to be turned on before the computer.)

MIKE VANCE
via the Internet

PC MAGAZINE: The two-for-one swap for the SCSI cards makes good sense, provided you truly don't have a way to free up an IRQ. Chances are good, however, that you don't need the bootability.

If you did have the bootable SCSI adaptor, you could create a bootable Jaz disk and use that to boot from in the event that your hard disk suffered a catastrophic failure. On the other hand, many recent systems have BIOS versions that let you boot from SCSI adaptors (or CD-ROM drives, for that matter). And even if your computer doesn't have this feature, you can always create a bootable floppy with the drivers required to get the Jaz drive working, which will give you equivalent

protection. Saving that extra expense for half an hour's work is a pretty good return on investment for most folks.

Also, the bootability won't solve your scanner problem, but there is a quick fix for Windows 95 users. If you have a SCSI device turned off when you boot your computer, the device will not be found on the SCSI bus even if you turn it on later. There is a way to trick the system into checking the SCSI bus again for late arrivals, however. Go to the System applet in Control Panel and select the *Device Manager* tab. Then choose the *Refresh* button; the system will rescan the SCSI bus, and your scanner should appear as an available device. This beats rebooting, and it can save a lot of time for people who do not use their SCSI scanners frequently. —Alfred Poor

The Case of the Disappearing Toolbar

I'm just about ready to trash Internet Explorer 3 because of a problem with the Mail module. I get no toolbar, no matter what I do. This only happens in Mail, where all I get when View | Toolbar is checked is two parallel lines about 1 mm apart. Because of this, all I see is my Inbox files, and I can't change folders. My Outbox, Deleted and other folders have effectively disappeared. Do you know how I can get the toolbar back?

STELIOS PATRIKIOS
via the Internet

PC MAGAZINE: Figure 2 illustrates the problem. I was able to duplicate it by corrupting the Mail utility's stored layout. The toolbar was reduced to a tiny stripe, and nothing I could do would bring it back. The only solution is to carefully edit the Registry. Launch RegEdit and navigate to HKEY_CURRENT_USER\Software\Microsoft\Internet Mail and News\Mail. Highlight Mail, then select *Export* from the *Registry* menu to make a backup copy of the current settings, just in case. Now highlight the value called *Layout* in the right pane and delete it. The next time you run Internet Mail, the program will use the default layout. From here, you can tweak the settings to get back your own preferred layout. —Neil J. Rubenking

Creating an Acronym List

After creating a document in Microsoft Word 7 with a large number of acronyms, I found out that I needed to add an acronym list. Going through the document word by word

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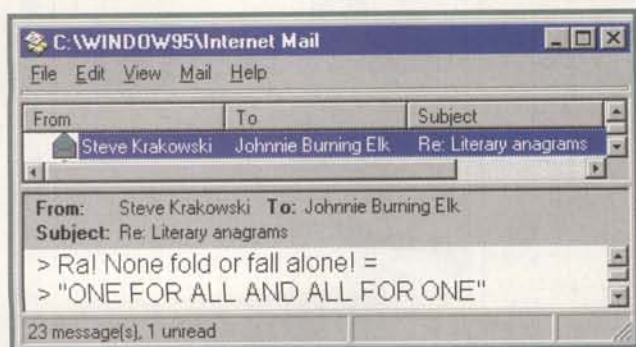


FIGURE 2: The Mail utility's toolbar has almost disappeared. The only way to get it back is to edit the registry.

seemed both inefficient and error-prone, so I partly automated the process using Word's spell-checker. Here's how:

Start by creating a new custom dictionary called *Acronyms*. To create it, choose **Tools | Options, then Spelling | Custom Dictionaries | New**. Enter the name, and choose **Save**. Make sure it's the only custom dictionary with a check next to it and choose **OK**, then **OK** again to return to your document. Next, spell-check the document. Word will stop at most acronyms. In each case, tell it to add the word to the *Acronyms* dictionary.

When you're done, use the **Tools | Options** command again to reset Word to use your usual custom dictionary. Then move the file *Acronym.dic*, which you should find in the directory *MSOffice\Common Files\Microsoft Shared\Proof*, to an appropriate data directory. When you open it, you'll find the acronyms in alphabetical order, one to a line, so you can easily add the definition for each.

Alas, this method isn't foolproof. The spell-checker will skip acronyms that also happen to be English words, which means you'll still have to look through the document for acronyms and compare them with the compiled list. Even so, this technique saves a lot of time and effort.

GREG KARAMBELAS
via the Internet

PC MAGAZINE: Although this innovative use of the spell-checker can certainly help compile an acronym list, a better choice is to take advantage of the pattern-matching capabilities in Word's search-and-replace feature. The best strategy will depend on how you've entered the acronyms, but here's one approach, which assumes that all the acronyms use only uppercase letters.

Starting with a copy of the document—and with the original safely stored under a different filename—you can search for all the words that start with two uppercase characters and format them with any format that you know you

(including the brackets) in the **Find What** text box, and check the **Use Pattern Matching** check box. In Word 97, the check box is labelled **Use Wildcards**, and you may not be able to see it without choosing the **More** button first. By either name, the check box will tell Word to treat the entry as a pattern to match rather than as a literal match. This particular pattern tells Word to find all words that begin with two uppercase characters from A through Z. More precisely, the "[A-Z]" tells Word to look for uppercase characters, the "{2}" tells it to look for two in a row, the "<" at the beginning tells it to look for characters at the beginning of each word only, and the ">" at the end tells it to select to the end of the word.

Move to the **Replace With** box. Leave it blank, but while still in the box, choose **Format | Font** and make sure there is a check with a white background—not a grey background—in the **Strikethrough** check box. All other check boxes and text boxes should be blank. Then choose **OK**. Make sure **Search** is set to **All**, and choose **Replace All**. Note that if you simply leave the **Replace With** box blank, Word will delete anything it finds. By defining a format to replace with, however, you're telling Word to keep the text and replace the format.

At this point, all the acronyms will be formatted with the strike-through format. The next step is to search for anything that's formatted in any other way and get rid of it. First, go to the **Find What** box and delete the search entry. While still in the box, choose **Format | Font** and define the font to search for as strike-through. The **Strikethrough** check box should not show a check, while the other check boxes should show a check with a gray background. The text boxes should all be blank. Choose **OK** to return to the **Replace** dialog box. The **Format** designation in the **Find What** area should read **Not Strikethrough**. Go to the **Replace With** text box, and enter **^p**, to replace each match with a paragraph return. Then make sure the **Use Pattern**

haven't used in the document. (For this example, I'll use the strike-through format.) You can then delete everything that isn't formatted that way, so you're left with acronyms and the occasional oddball reference (such as "MSOffice") that isn't an acronym but starts with two uppercase characters.

In Word 7, choose **Edit | Replace**, enter **<[A-Z]{2}>**

Matching check box (or the **Use Wildcards** check box for Word 97) is unchecked and choose **Replace All**.

When Word finishes the search-and-replace operation, close the **Replace** dialog box, hit **Ctrl-5** (using the 5 key on the numeric keypad) to select the entire file, and choose **Format | Font** to redefine the format and remove the strike-through format from the acronyms. All you should have remaining in the document at this point is a column of acronyms as well as the occasional nonacronym (such as *MSOffice*) that starts with two or more uppercase letters. Each word will be on its own line. To sort the acronyms (along with the occasional nonacronym), select the entire file with **Ctrl-<Numpad 5>** once again and choose **Table | Sort Text**. The **Sort Text** dialog box should open, with its options set to sort by paragraphs in ascending order with no header row. Choose **OK** to sort the file.

At this point, you can visually inspect the list, deleting blank lines (which will be together at the beginning of the file) as well as duplicate entries and the occasional nonacronym. You might also use the **Edit | Find** command to search for nonacronyms, by searching for lowercase letters. The search pattern is [a-z].

If you create acronym lists often, you may want to record all these steps in a macro, for a one-step solution. You could also add a routine, or write a separate macro, to search for and delete duplicate entries automatically—an option that I don't have room to show here but that I'll revisit in a future tip if there's enough interest.

For a quick and dirty approach to deleting duplicates and other unwanted lines, you can create a two-column table, add text in the second column for those lines you want to keep, sort by the second column, and then delete all the entries with nothing in the second column.

To create the table, select the entire file with the key combination **Ctrl-<Numpad 5>**, choose **Table | Insert Table** to create a one-column table, and then—with the entire file still selected—choose **Table | Split Cells** and accept 2 for the number of columns. In Word 97, also make sure that the **Merge Cells Before Split** check box is not checked. Then choose **OK**. Work your way through the list, entering anything you like in the second column—from a single arbitrary character to a definition for the acronym—for each line you want to keep.

When you're finished going through the table, choose **Table | Sort**, which will open the **Sort** dialog box and should automatically select the entire table. Set the **Sort** options to **No Header Row**, sort by **Column 2**, and

choose OK. This will group the entries that are blank in the second column, so you can select them all and delete them at once. If necessary, sort by the first column again to return the acronyms to alphabetical order. —M. David Stone

Transposing Excel Ranges

When I import text files into Excel, my labels appear down the rows instead of across the columns. Is there a way to rotate the spreadsheet to move the labels from their row positions to column positions?

GILBERT VELA
via the Internet

PC MAGAZINE: You can use Excel's TRANSPOSE function for this purpose. TRANSPOSE changes the horizontal or vertical orientation of an array. The syntax is

=TRANSPOSE(array)

TRANSPOSE is an array function, which means you have to use it a little differently from the way you use most of Excel's other functions. The array argument is typically just a range of worksheet cells. But the place where you enter the TRANSPOSE function should also be a range—in this case a range with the same number of columns as array has rows and the same number of rows as array has columns.

Let's say, for example, that you want to transpose A1:D12, a range with 12 rows and 4 columns. You would first select a blank range that had 4 rows and 12 columns—perhaps A14:L17. With that entire range selected, you would type

=TRANSPOSE(A1:D12)

and then, instead of simply pressing Enter, you would press Ctrl-Shift-Enter. Excel would transpose the cells in A1:D12 and copy them into A14:L17. Each cell in that output range would then contain the formula

{=TRANSPOSE(A1:D12)}

The braces with which Excel surrounds the formula (you never put these in yourself) simply indicate that the formula is an array. Note that because the entire output range—A14:L17 in our example—is driven by a single formula, you can't edit the formula for any individual cell within the range. You can format individual cells, but if you try to type a number over one of these cells, Excel will produce an error message. To edit the formula, you must start by selecting the entire range.

If you enter the TRANSPOSE formula into a

range that doesn't have the appropriate number of rows and columns, Excel will accept the formula, but it will make certain adjustments. If the range is too small, the program transposes only the cells that fit. If the range is too large, it pads the extra cells with #N/A values. If you forget to enter the formula as an array—that is, if you don't press Ctrl-Shift-Enter after typing the formula—you will get a #VALUE! error.

Once you've done the transposition, you may want to get rid of the source cells. To do this, you'll need to convert the array-formula results to a set of constants. Select the output area (the range where you entered your TRANSPOSE formula), copy it to the Clipboard, keep the selection on the output area, and choose *Paste Special* from the *Edit* menu. Once you've converted the formula results to constants, you no longer have an array, and you can modify the contents of cells individually. —Craig Stinson

Printing DOS-Style in FoxPro

We have been running Microsoft FoxPro for MS-DOS 2.5 and are trying to switch to Microsoft FoxPro for Windows 2.6. In the DOS version of FoxPro, you can specify the printer font by sending a character string filled with control codes to the printer, such as:

```
PRSPEC = CHR(27)+"(8U"+CHR(27)
+"(s0p12.00h10.0v1s0b3T"
SET PRINT ON
SET CONSOLE OFF
? PRSPEC
```

In this case, the printed text would appear in italics until another set of control codes was sent to the printer. FoxPro for Windows 2.6 (FPW26), however, doesn't recognise this as a printer command and simply prints the string as text. FoxPro for Windows has a FONT clause for many commands, but a clause is effective for one command only, after which the font reverts back to something else. We are looking for a way either to make FPW26 work like the DOS version or to set a default printer font and use the FONT clause for those special occasions when a different font is needed. Otherwise, every print command will have to include the FONT command, and we have many such commands in our programs.

Perhaps this is a problem others are having also. Thanks for your help.

PAUL BRINK
via the Internet

PC MAGAZINE: I'll offer a few solutions that you should consider as temporary fixes until you can fully convert your application to FoxPro for

Windows. Your goal should be to migrate to a position where you can support Windows-style printing techniques, which in FoxPro's case means using the Report Writer instead of one of the various direct-printing methods you may be accustomed to using under DOS.

In the meantime, you can set the default printer font using the following undocumented command

SET PRINT FONT "fontname",point size

For example, to set the default printer font to 8-point Courier New, you would issue the command

SET PRINT FONT "Courier New", 8

After this command is used, everything should print in that font unless you specify otherwise using the FONT clause.

Microsoft offers several other suggestions for trying to print directly to the printer using FoxPro for Windows. For instance, you can try using ??? " " (three question marks, a space, double quotes, a space, and double quotes) to open the printer in raw mode. Alternatively, you could write both the printer control codes and the contents of your report to a text file and then copy that file to the LPT1.DOS printer port. A third option would be to use the Generic Text Windows printer driver. I've had varying levels of success with these techniques, but they're there for the asking should you decide that SET PRINT FONT doesn't meet your needs.

See the following Microsoft Product Support articles on the support.microsoft.com/support Web site for more information: Q99542, "Printing Reports Created w/Question Marks in FP for Win," and Q99595, "Using @...SAY Commands & Control Codes to Print in FP/W." For more information on the LPT1.DOS printer port, see Q68652, "Printing to Windows LPT1.OS2 or LPT1.DOS Port," and Q82749, "Using LPT1.OS2, LPT1.DOS, or FILE: Ports When Printing." —Sal Ricciardi ■

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COUNTERPOINT

How to beat computer obsolescence.

By Anna Raciti



Politicians, banks, designers, computer vendors. They all have one thing in common. They seem to think they know more about what's best for us than we do. Don't you wish that for once they'd sit down, shut up and listen to what the public wants instead of just dishing stuff up and expecting us to lap it all up?

I'm pleased to say that some computer vendors look like they've started listening to consumers for a change—and they're doing some innovative new deals—enticing consumers by alleviating some pretty basic concerns they have about purchasing PCs.

What is a buyer's biggest concern when buying new computer equipment? Surely it would have to be the worry that your high-tech goodies will become nothing more than expensive desktop decorations before their time. With the rapid innovations in computing power, it's hard to ensure that the latest technology you purchase today will not become obsolete in less than two years time. Of course, that's not to say you won't be able to use your computer years down the track, but try running new apps or the latest games. It just won't work. And that's got consumers scared.

So what is the computer industry doing to try and allay fears and give high-tech buyers a little consumer confidence?

For many years vendors did nothing much. Their most imaginative answer to equipment obsolescence was to sell you the

most expensive system they had, packed with the absolute latest components. By selling you the most up-to-date system, you'd get a little longer use from your system—even if it did cost you two or three thousand dollars more than the cheaper system that you wanted in the first place.

But a new scheme pioneered by small US-based PC vendors may prove the solution for wary Aussie consumers. The anti-obsolescence scheme consists of buyers paying a few hundred dollars extra up-front to have their new computer upgraded every year or two.

The plan works much like the extra warranty options that have been available for many years—you pay a little more at purchase time, you get more in the long run. But unlike the mini gamble that you take when you order extra warranty, ("Will I need the extra warranty? If I don't, I've paid extra for nothing") the upgrade option guarantees you component upgrades for what is effectively the life of your PC.

One vendor that's started such a plan in Australia is Compu Centre, a Melbourne-based national PC vendor and manufacturer. When you purchase a PC through Compu Centre, you are given the option to purchase the company's Safe Guard anti-obsolescence policy for an extra \$400. The extra \$400 will buy you four years worth of upgrades to the next level of processor. In other words, if you purchase a Pentium II 350MHz system today with the Safe

Guard option, in a year's time, you will receive a free upgrade to a PII 400MHz processor, the year after, a PII 450MHz processor, and so on. According to company manager Danny Jovica, Compu Centre will absorb all parts and labour costs to upgrade your processor. The scheme applies to all PC purchases, so even those who've purchased a Pentium 233 processor with the Safe Guard option are covered for an upgrade to Pentium II. "In those cases we've had to change the motherboard and power supply," said Jovica, "but customers have not had to pay any extra."

RAM and other components are not covered by Safe Guard, but if a processor needs to be upgraded from 333MHz to 350MHz, thus requiring the new 100MHz compliant memory, the PC's old RAM will be replaced free of charge.

Caveat Emptor

While on the surface, such a plan looks like great value, you should check the fine print before handing over the extra cash. Here are a few things to look out for when opting for an upgrade scheme.

Beware of fly-by-nighters. Less than reputable companies have embarked on these and other (even more enticing schemes) in order to win business, before shutting up shop, never to be seen again. If you don't trust the company you are buying from, or if you suspect they won't be there a few years down the track, you won't want

to buy into such a scheme (if fact, should you be purchasing a PC from this company at all!). If the company goes down the tubes, you'll find it near impossible to have your deal honoured, let alone get your money back.

Make sure you know what components the vendor will upgrade under the scheme. Although a processor upgrade is the most basic and arguably the most beneficial upgrade you can buy, there is more to upgrading a PC than just throwing in a new processor. You'll probably want extra RAM and a faster, flashier video card for when the latest software starts making increased demands on all your components.

You should also expect your hard drive to fill very quickly. Every time a new drive with a huge new storage capacity comes to market, I find myself thinking "how could anyone manage to fill that drive". But even 11GB monsters can start feeling quite cramped once you've installed an office suite, graphics program and a few of the latest games. If the company doesn't offer to upgrade these components, make sure you budget for them when upgrade time comes along.

Ensure that parts and labour and any other expenses that might be associated with a particular processor upgrade are included in the deal. You shouldn't have to fork-out extra for hidden charges, nor should you have to upgrade the computer yourself, especially if you don't feel confident working inside your PC.

Finally, if you're dealing with a vendor that's not based in your local area, find out whether they will cover freight and insurance from your home to the factory for upgrading. If they don't, be careful, shipping your PC interstate could end up costing you more than the price of the upgrade itself.

INFOTAINMENT

Customise Your System

We love to customise our computers with our own favourite wallpaper, and wacky icons and cursors, it's all part of making us feel more at home with our own computers. A new product from Individual software (Dataflow, 9417 9700, www.dataflow.com.au) now lets you create your own personalised screen savers.

The program, **Create Screen Savers Quick & Easy**, lets you create screen

savers from photos, drawings and clipart. You can even incorporate your own sound and video files. Screen saver creation involves importing your files, selecting special effects and saving your creation. If the creative muse eludes you, you can choose from clipart and sound files included with the program or just use one of the enclosed screen savers.

The program is priced at \$29.95. Also included in the Quick & Easy series is Plan Retirement, Learn Windows 95, Stay Organized, Learn Typing and Create Resumes. —Janice Buckley



UTILITIES

Does Your PC Comply?

Year 2000 utilities released to guard your desktop.

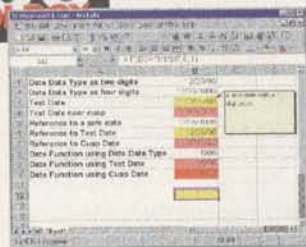
From mainframes to servers to desktop PCs, experts are saying that no computers are immune from the Year 2000 problem. In an effort to protect home and office PCs, Network Associates (02 9437 5866, www.nai.com) and Symantec (02 9850 1000, www.symantec.com.au) have released new products to diagnose and fix Y2K problems.

The Y2K problem stems from the fact that most computer software was written taking into account only a two digit year field. On the first of January 2000, applications, BIOS, system clocks and data that are not Y2K com-

pliant can wreak all sorts of problems.

Adding to Network Associates' arsenal of Y2K products is the **2000 ToolBox**, a product designed specifically for standalone desktops and notebooks.

Y2K GUARD: (Below) Symantec's Norton 2000 flags suspect date fields, (left), Network Associates' 2000 ToolBox.



INFOTAINMENT

Holidays in the Sun

Holidaying overseas these Christmas holidays? Then you'll want to start researching the perfect holiday now. Webster Publishing (Teco Multimedia, 1800 060 825, www.websterpublishing.com), producer of World Encyclopedia 1998, has released a new series of multimedia CD-ROMs for travellers. The first product available in the World Travel Series is **Holidaying Asia**, a guide to accommodation, site-seeing, food, culture and entertainment in a number of Asian countries.

Whether you're looking for tourist attractions or less well-known sites you'll most likely find it through the programs search engine. Also helping you plan your trip,

photos and video footage to help you decide where to go and an itinerary planner to help you decide how to fit all your destinations into your schedule.

Countries covered by the Holidaying Asia CD-ROM are China, Hong Kong, India, Indonesia, Korea, Malaysia, the Philippines, Singapore, Thailand, Vietnam, Bhutan, Brunei, Japan, Laos, Macau, the Maldives, Myanmar, Nepal, Pakistan, Sri Lanka and Taiwan.

To top it all off, if you have Internet access, you can even book the holiday via direct Internet links. Holidaying Asia is priced at \$49.95. Holidaying Australia, Holidaying the Pacific and Holidaying Africa are also available. —AR



2000 Toolbox monitors system hardware, software and personal user data files for problems, while offering recommendations and fixes.

The program checks and fixes data files, databases and spreadsheets for incorrect date fields as well as checking for Y2K Real Time Clock Hardware, BIOS and OS problems. According to Network Associates, the program also keeps a knowledge base of how popular applications are affected by the Y2K problem, including fixes. The program also includes disk imaging and backup tools to rescue your system in case of an emergency.

2000 Toolbox is priced at \$69.95. An enterprise version of the product, ZAC 2000 is also available for large distributed

environments.

Symantec's Y2K answer for business and consumer PCs is Norton 2000. Like the Network Associates product, Norton 2000 scans data files for incorrect date fields. Norton 2000 also tests and fixes time clock hardware and the system BIOS.

Later in the year, Symantec plans to offer application scanning with **Norton 2000**. Once the program is able to test applications for Y2K compliance, users can check Symantec's database of compliant applications through the Symantec LiveUpdate online update system. Corporate versions of Norton 2000 are available now, priced at \$79 per user for 10-24. A retail version of Norton 2000 will be available later in the year. —Anna Raciti

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PRODUCTIVITY SOFTWARE

Forget Designers, Edit Images Yourself

Now that you have that scanner or digital camera, a whole new world of digital imaging is open to you. And in anticipation of another busy holiday season for the burgeoning digital photography market, the major graphics software vendors are readying improved versions of their consumer image-editing software, emphasising such conveniences as direct links to digital cameras and scanners, more professional-looking templates, and tighter integration with the Internet.

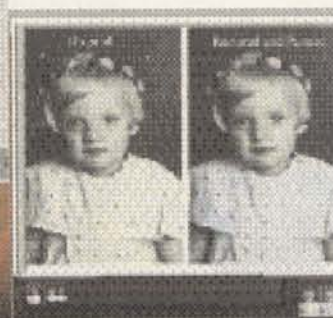
Putting more control over imaging into the hands of home users is **Adobe PhotoDeluxe Home Edition 3.0** (\$79), from graphics stalwart Adobe Systems (1800 065 628, www.adobe.com). This version builds on Adobe's popular step-by-step interface that guides novices through the world of image editing and adds such features as templates for printing multiple images on one page, compatibility with Photoshop plug-ins, and a simpler method for acquiring images from digital cameras and scanners.

The interface has been revamped to include a three-tabbed panel at the top of your screen; each of these menus direct you to Adobe's Guided Activities, wizards that step you through common tasks. Advanced Menus are available to give more experienced users direct access to tools via pull-down menus.

Using the Get and Fix Photo features, you can easily adjust the look of your images with tools for cropping, changing contrast and colour and adding special effects. Use Cards and More to create common projects, such

as calendars and cards. With the new PhotoParade slide show feature, you can select from themes that include animation and sound and then insert your images to create your own slide

show for the SOHO market. This version is almost identical to the home version in terms of interface and technology. The business version does, however, contain projects designed specifically for businesses that frequently require image editing (such as real estate, marketing and travel). Like the home version,



HAVE FUN EDITING YOUR PHOTOS: (Clockwise from top left) Adobe PhotoDeluxe Home Edition, Microsoft Picture It! 99 and MGI's PhotoSuite II.

show. The included PhotoDeluxe viewer is required in order to watch the slide show. The third panel, Connectables, provides an easy way to download updates, such as new templates, without having to load your browser and search these sites.

One of the most significant additions to PhotoDeluxe is the ability to print multiple pictures on one sheet of paper—a big advantage when you consider that quality photo paper can cost around \$2 per sheet. The templates let you place multiple images of varying size on one sheet of paper; unfortunately, the selection of templates is limited and you can't create your own layouts.

Also just released from Adobe is the **PhotoDeluxe Business Edition 3.0** (\$199) designed

for the SOHO market. This version is almost identical to the home version in terms of interface and technology. The business version does, however, contain projects designed specifically for businesses that frequently require image editing (such as real estate, marketing and travel). Like the home version,

Business Edition includes Adobe Collectables so that you can expand your library of templates. Keeping in step with Adobe, Microsoft (13 20 58, www.microsoft.com.au) will be releasing a new version of **Microsoft Picture It! 99**, (\$89). Major new features include better links to digital cameras and scanners, expanded photo-editing tools, and more content.

Using the more advanced drivers in Windows 98, Picture It! 99 can now download batches of photos directly from most digital cameras. The program includes a new still image architecture that automatically wakes up the PC and scans an image you insert in a scanner—assuming you already have Picture It! 99 loaded.

Quick Touchup provides instant access to the most com-

monly used tools and adjustments, including crop, remove red-eye, rotate, brightness, contrast and tint. Picture It! 99 also has a cloning tool for painting one part of an image onto another part. You can now select parts of an image based on their colour as well as skew and deskew images. The wrinkle/blemish remover, along with a tool called Old to New, are useful for restoring old photographs. Picture It! 99 is bundled with two CD-ROMs with new content and project templates.

The new version is actually part of Microsoft's forthcoming Graphics Studio line. **Microsoft Graphics Studio Home Publishing 99** (\$89) includes Picture It! Express and adds a vast collection of desktop publishing projects for print and the Web. Among the 8500 project templates are calendars, crafts, party sets, personal Web pages and e-mail greetings. Stepping up to the **Home Publishing Suite 99** (\$189) gives you the full version of Picture It! 99.

MGI (GT Interactive, 02 9902 3000, www.mgisoft.com) has taken its popular PhotoSuite program and redesigned it from the ground up. **PhotoSuite II** (\$99.95) provides direct access to digital cameras and scanners, tight Internet integration, and 500 new project templates.

The new interface was built using Dynamic HTML and consists of six modules: Photo, Projects, Album, Slide Show, Internet and Guides. New editing tools include: Magic Scissors for selecting objects in an image; dodge and burn for lightening and darkening specific areas; automatic touch-up; and red-eye removal; and support for borders, frames and shadows.

PhotoSuite II also offers effects for turning ordinary photos into bizarre images. You can convert albums to Web pages and create slide shows with background music and video-style transitions. —Matthew Graven

GameSpot

www.gamespot.com.au

One for the Roadwarriors

486 Game Pak rates 4.86 out of 5!

486 GAME PAK

Sierra's **486 Game Pak** features four titles that have re-emerged from the seemingly long lost days of the, you guessed it, the 486MHz era. **3D Ultra Pinball**, **Trophy Bass**, the acclaimed **You Don't Know Jack** and the perennial **Hoyle's Classic Card Games** make up the selections on offer.

Our initial reaction to the Pak was "These guys should have aimed this at mobile PC users!" And what should we find on the back of the box? A decal claiming the Pak is "Perfect for laptops". And it is. While even laptops have largely forgone the use of any processor below Pentium level, they are still lagging behind on the graphics front. The games in the Pak, however, make the most of the processor power available rather than demanding a hardware upgrade. Even technophobes will get something from the broad range of game categories available.

The fact that all the Pak's titles have spawned sequels is the most telling evidence of the games' popularity and therefore the Pak's potential.

Trophy Bass is the title with the narrowest focus. All jokes about fishing being a sport aside, **Trophy Bass** is a true simulation, mixing virtual bass fishing with a tutorial which can help both on the screen and on the pond.

3D Ultra Pinball is, in Sierra's words, "The first full 3D pinball game" to "launch you into cyberspace, unencumbered by the realities of the physical pinball table." This

game is also a good example of the small file sizes and setup times for games in this Pak. 3D



486 GAME PAK

Price: \$49.95, Wolf Interactive,
Ph: 02 9477 9600, www.sierra.com

UP's "large" install demands a tiny 11MB, while the minimum install takes up an astounding 100KB. And despite the warning that setup may take 10 minutes to complete, you'll find it more likely to take around 10 seconds. Even the most miserly hard drive will easily accom-

modate the files and the most time starved road warrior will be able to set aside the time to get the games up and running. The hard part will be turning the games off in order to convert your laptop back into a

mon, patience, poker and other games, the rules with which you play these games are those that set the standards for play world wide. Animations, background music and opponents can be set or removed making the whole experience both enjoyable and compelling.

Rounding out this eclectic group of games is the much imitated, but as yet unsurpassed, **You Don't Know Jack**. The game's concept is similar to the famous gameshow, **Jeopardy**. The comedy starts right from the word go in this game as YDKJ imitates a TV show on which you are about to be a contestant. You select a category of questions and then take a shot at answering the cryptic and usually highly amusing questions. The grandfather of four other YDKJ releases, this game should be played by every single earth inhabitant at least once!

In short the 486 Game Pak will be a welcome addition to every PC users arsenal. —Craig Sharkie

mobile office.

The Hoyle range of gaming products needs little introduction or explanation. Hoyle is arguably the leading proponent and source of games' rules and this title exemplifies this. Not only can you try your hand at hearts, cribbage, gin, backgam-

Sport to Die for

In this tourney, performance enhancing drugs are a must.

WARTORN

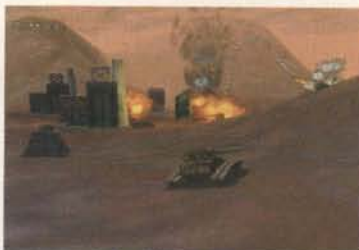
The demo of **Wartorn**, by Australian developer Eyst, has hit the Information Super Highway and taken off with a roar.

Whilst the demo is scrolling, all the vision is taken from units programmed to run within the game environment. And if you're impressed by what you see in the demo—including the floating point view—you'll be pleased to know you can recreate it all when the game is released, hopefully in early 1999.

In game, you have an unheralded amount of control, being able to select from 32 different "teams" with accompanying camouflage patterns and four different weapon sets. You are also able to dictate parameters such as resource collection and unit production, as well as details such as munitions supply. Not convinced that tanks should be able to fire indefinitely without reloading? You have the option of limiting ammunition supplies, forcing your

vehicles to periodically rearm.

Stay tuned for an indepth preview next issue, but in the mean time, you can check out Wartorn's website at www.wartorn.com or download the demo now from this month's cover CD. —Craig Sharkie



WARTORN DEMO

Price: Free, Eyst 02 4342 6976,
www.wartorn.com

Battlespire: Inspiring?

RPG reunites with its faithful old DOS companion.

BATTLESPIRE

Battlespire, from Bethesda Softworks, would once have been hailed as genre breaking. Today, however, it is a game best be enjoyed by RPG fanatics.

Battlespire was Bethesda's answer to the torrent of fan requests that the company received following the release of **Daggerfall**, the sequel to **Arena**.

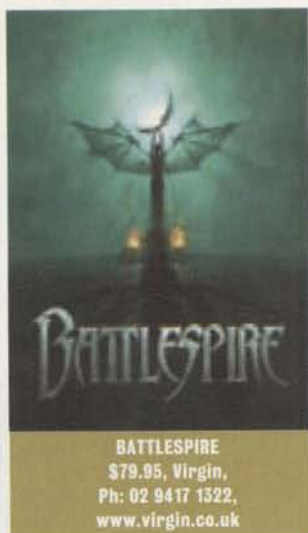
Bethesda hoped to attract Daggerfall fans' attention with Battlespire, and to a certain extent, they succeeded.

Maintaining the high levels of user control over the development of characters, Battlespire is a power-gamer's dream. Not only can you dictate your characters' skills and

equipment, you are also able to adjust tolerances and immunities, creating all manner of interesting characters. We developed a character class that was largely immune to magic, had the ability to regenerate and while only able to wield one class of weapon, was extremely good with that weapon.

One of our playtesters went adventuring unarmoured and kept ducking back to check out his character description. Why do that? When you first load Battlespire, you are given the chance to invoke an adult mode. Where the non-adult, childguard mode has reduced depictions of violence ingame and fully clothed character im-

ages, the adult mode doesn't hold back. Although the adult violence is actually quite tame,



character depictions are much less modest—male characters can strip down to a groin flap,

and the females forgo even that (yup, they're nekkid!)

The gameplay in Battlespire, while easily better than early Ultima titles, doesn't stand up well with modern counterparts but its puzzles are involving and fit well with the plot as it develops.

Battlespire's AI is one of its strongest points. Creatures flee from you in combat if they realise they are outclassed before you have had a chance to dispatch them. Opponents will try to evade you and attack you from behind and any enemies you face will wait for the most opportune time for them to cast any spells.

Battlespire is a game that will keep confirmed RPG-aholics entranced, but it won't drag many Quakers away from their Strogg enemies. —Craig Sharkie

Toilet Training Your PC?

Growing lifeforms on your PC is becoming the Norn.

CREATURES 2

Mindscape Entertainment and Cyberlife Technologies brings you all the fun of raising your own progeny without the annoying sanitary complications with the release of **Creatures 2**. Released in Australia by Dataflow under its Wolf Interactive division, Creatures 2 offers you six more Norn eggs just waiting for you to hatch them.

In C2, your goal is to successfully raise, nurture, educate and eventually breed your surrogate Norn offspring. Norns are the irrepressibly cute products of ancient and now lost Shee genetic engineers and you are charged with taking over where they left off and continuing their research.

Creatures 2 is more than just a game, it's an experiment. Cyberlife Technologies are involved in the development of a new branch of scientific endeavour that they term Cyberbiology. With applications in-

cluding personable interfaces, robotics and intelligent systems, what you are playing



CREATURES 2
\$69.95, Ph: 02 9902 3000,
www.gtinteractive.com

with today, might be performing life saving surgery on you in the future.

Mindscape list these impressive developments of C2 over its predecessor: "Major en-

hancements to the Artificial Life technology... including the definition of Organs (such as the heart and lungs), improvements to the digestive and immune systems, and the addition of new lobe and neurotransmitters to potentially increase the intelligence of the Norns."

These little guys make Tamagotchis look like etcha-sketch scribbles beside the Mona Lisa with their complexity.

One of the most intriguing facets of C2 is the level of public involvement in the conception of C2's new features. Just as the Norn respond to your input, so too did Mindscape. User inspired additions include: a larger Albion—the Norn's homeworld is now twice the size of the original Creatures world; a more realistic simulation of life—Creatures 2 has a complete working eco-system; more variations in Norns—C2 introduces two

new species: a new Grendel and the Ettin.

All this power over the evolution of a species does not come without its costs. Firstly, the Norn lifecycle spans only eight of our hours, so if you are successful, you'd best prepare from some heartbreak as you lose virtual offspring. Second, the power to control that much biology comes at a price. While the system requirements are listed at a reasonable 166MHz, our testing machine ran at 200MHz, and occasionally felt the strain.

But don't let this put you off. The involvement required to master the growth and development of a new life, albeit a virtual one, is a reward in itself. As you begin to distinguish that your first Norn is no longer simply muttering gibberish, but is actually beginning to incorporate the speech you are teaching, you'll be glad for the Creatures Web community where you can proudly show off your fledgling cyberchildren.

Check out the C2 Website at: www.creatures2.com. —Craig Sharkie

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PC MAGAZINE AUSTRALIA CD ZONE

GM Needs Food Badly

Monolith "gets medieval" on Gauntlet.

GET MEDIEVAL

If you're reading this review in the hopes of finding a new role-playing game, you should probably stop reading now. If you're a fantasy action fan that can't wait for **Heretic II**, you should do likewise. This review might as well be of a much-beloved 1980s Atari arcade game in which players wander through dungeons slaying beasts and gathering treasure. One fact will immediately become apparent when playing **Get Medieval**: this game is **Gauntlet**.

From the opening animation, there's plenty of tongue-in-cheek humour about fantasy adventurers. A dragon swoops down over a village as the voices of four adventurers (apparently watching the intro animation like a movie) make humorous comments such as "The flying chicken is very angry." The four adventurers

are basically the same four hero types as in **Gauntlet**: the elf archer Eryc, the Valkyrie-like Kellina, the brutish barbarian Zared, and the sorceress Levina. The two-bit plot has the adventurers going into a dragon's dungeon to slay the evil beast and gain gold and glory for themselves.

If you still don't believe in the similarities yet, allow me continue.

Gameplay is exactly the same as **Gauntlet**. There's the top-down view of the characters as they move around a dungeon picking up treasure, potions that give you health (like food in **Gauntlet**), and power-ups that will improve your weapons and shields. Along the way there will be baddies to slay and their spawning points (spiders' nests, beast cages) to destroy. The dungeon crawl is broken up by the appearances of the "boss"

creatures. Appearing as enlarged versions of the smaller creatures, there's not much to be said about them except that practically one hit from them

feet, but his arrows do little damage. The other two characters fall somewhere in between.

During play, the characters make more humorous comments about their current situation. Each hero type has a different saying for certain events. For example, finding treasure, the elf shouts out "Ha ha! I'm rich!" while the sorceress exclaims "I'm going shopping!" Other conditions such as getting low on health, shooting much-needed items, and slaying large numbers of monsters also have their own sounds. And if for some reason you still aren't convinced of the similarities, just wait till you start mistakenly shooting healing potions.

The strange thing is, this game is still entertaining. With SVGA graphics and the humorous sounds, it just goes to show that some formulas will almost always work. This game may be **Gauntlet**, but **Gauntlet** is still a lot of fun. —Craig Sharkie



kills your character.

Character design doesn't divert much from **Gauntlet**. Each character has a certain set of statistics that depends on what character class is chosen. The barbarian has high weapon strength, but is slow. The elf is quick with his bow and on his

GAMESPOT.AU DOWNLOAD ZONE

Hello, Hello, Follow Me, OK

OddWorld Inhabitants make Abe more or less odd.

ODDWorld: ABE'S EXODUS

Oddworld: Abe's Exodds sees your hero and mine becoming more and more, well, human.

Abe, the absinthe-skinned Mudokon and star of GT Interactive's **OddWorld**: Abe's Oddysee title, embarks on his second journey, picking up precisely where his last mission left off and is an offshoot of the first title.

The story begins at the point where, by destroying the factory and all the Mudokon bones stashed inside (during the end of the first game), Abe has given the Glukkons reason to need another cache of bones so they can continue making their carnivorous beverages.

In **Exodds**, players will again venture into the mission as Abe, only this time, with more feeling. Not only will **Exodds** include more gamespeak, players will also reportedly discover more intelligent

AI, and fellow Mudokons will wear their emotions on their skin, literally, as blue will depict melancholy, red will display anger, and so on.

As Abe, players will have to interact

with the Mudokons, by hugging and so forth, to keep them from committing suicide and even taking advantage of your kindness. Zombified Mudokons, notably Mudombies, will need Abe's assistance in finding their way to safety as well.

System Requirements: Pentium 133, 16 MB RAM, sound board, Windows 95

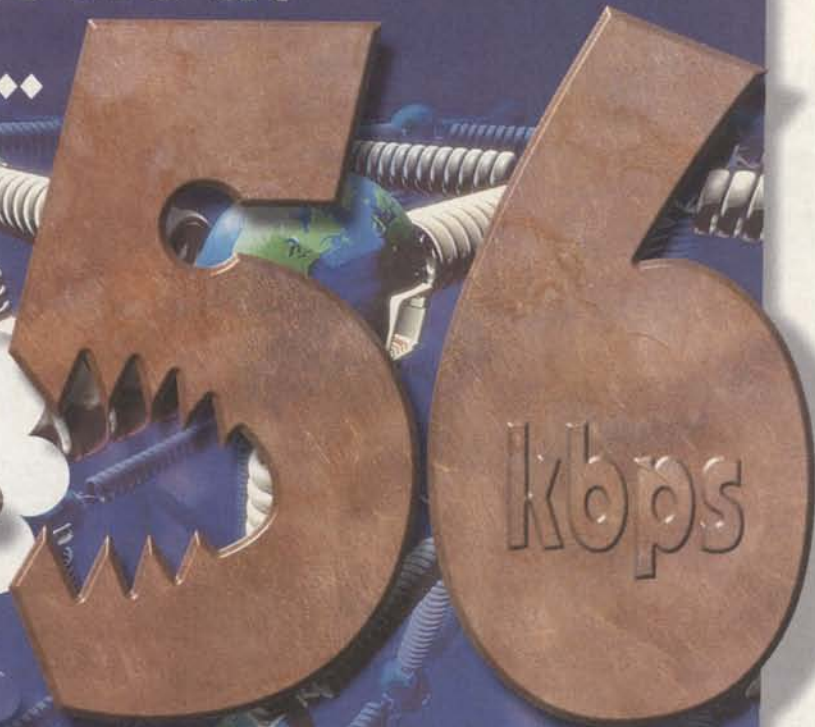
Download Size: exodds.zip 70.9MB



ODDWorld: ABE'S EXODUS DEMO
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MULTIPLAY

The image shows the box art for the game Quake. It features a character in a combat suit holding a large gun. The word 'QUAKE' is written in large, stylized letters at the top. Below it are logos for GT Interactive and id Software. At the bottom, there is a parental warning: 'PARENTAL WARNING: MA-15+. High level of animated violence.'

The logo for 'Internet PHONE' features a globe icon with a telephone handset. Below the main text, it says 'Talk for free over the Internet'. At the bottom right, there is a 'VOCALTEC' logo.

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Speed that Doesn't Kill

Holden out Ford a great high-speed chase.

NFS III: HOT PURSUIT

Need for Speed III: Hot Pursuit has roared out of the Playstation and into your PC garage with Electronic Arts latest driving simulation release.

And this is one title that has been truly optimised for the Australian marketplace. Gone from the cover is the exotic European car, replaced by those Aussie stalwarts, the GT Falcon and HSV GTS.

"Holden vs. Ford vs. The World" screams the box and inside you can put it to the test.

NFS III is a clever port, adding the functionality and benefits of the PC, without losing any of the gameplay from its PSX parent. With the power of a Pentium to fuel it, NFS III

on the PC offers what its parent only promised.

The most obvious upgrade, and the most demanded, is the graphics. Not only are you able

or serial, and NFS emerges as a techno-petrol heads dream.

Being able to race through 3D rendered versions of the races you are familiar with from the PSX is almost like taking part in the ingame cinematics you watched on your television set.



to utilise 3D software enhanced play, NFS also supports Glide and D3D. Couple this with the ability to enact eight player races over a LAN, as well as two player via modem

Another option that is not yet available for dogged console fans is the ability to download vehicles from the Internet. If the 15 licensed vehicles, are somehow not enough to

quench your desire, simply point your modem to the Web and add more to your stable. However, with selections from high performance coupes, race-bred supercars, pursuit vehicles, Italian exotics and, of course, the Australian muscle cars, it could well be quite a while till you turn to the Net for inspiration.

If the online poll is any indication, however, it appears that the Net may see more use than simply as a source for new autos. Sixty six percent of respondents are in favour of seeing NFS becoming more of a simulation title than a high speed arcade action game.

And if you think that the closest you will ever get to your vision of a fully customisable piece of Australian motor-ing history is the next motor show, it may be time to think ahead. —Craig Sharkie

Time For the Big Stick

The UN finally takes Roosevelt's advice.

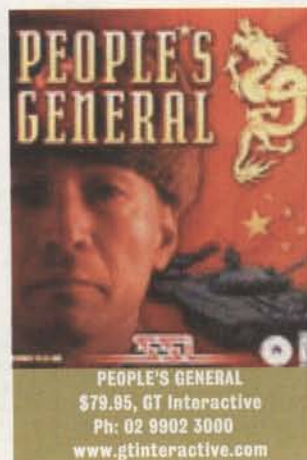
PEOPLE'S GENERAL

It was bound to happen. SSI's tremendously successful General series of games, first with the Five-Star series and then with the Living Battlefield series, has made the transition from World War II to the modern era with **People's General**.

The game is set in the early 21st century, and the United Nations is at war with an aggressive China for control of most of Eastern Asia. People's General represents the natural evolution of Panzer General II and the Living Battlefield series, including many new refinements, ideas, weapon systems and a game engine that has made a fairly successful transference to the modern era of warfare.

People's General and the previous games are typically labeled as "beer and pretzels"

wargames; they do not require a thorough knowledge base of military history and hardware, they are relatively easy to play, and are typically pleasing to the eye. Requiring only a rudimen-



tary knowledge of modern weapon systems (tanks, in-

fantry, missile batteries, helicopters, air strikes and the like), it can be played by basically anyone willing to give it a try. While the maps are hex-based, they are hand-painted beautifully in 16-bit colour. 3D models of various vehicles and infantry depict individual units. Moving and attacking is a simple job of selecting a unit, pointing to a hex within range, and clicking to move. When attacking, estimated battle casualties, based on the situation, are given, so you can somewhat accurately gauge if an attack will yield decent results or not.

If you've played the series before, you'll want to know what's new and different. Basically the engine is the same but has been neatly tuned to the modern era. Helicopters now behave like aircraft did earlier in the series (though they're much more powerful), and you now have the option of using air points to purchase air strikes, wild weasel and recon

missions, defense air support, or the ability to airlift troops. While People's General may be considered a "light" wargame, it is by no means easy or bereft of details. Units are rated for a dozen different capabilities as well as somewhat random special abilities and leadership characteristics. Some of the campaigns are downright hard and nasty and take a full understanding of the game system to do even moderately well.

However, a tutorial and numerous easier scenarios and campaigns ease you into the game without smacking you in the face with a learning curve that looks like the north face of Mt. Everest. Fans of the series will not be disappointed, and if the new and fairly unique subject material breathes new life into wargames—even beer and pretzel ones—then that can't be half bad either. —Craig Sharkie

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This month, sit back and enjoy the full version of Microsoft Internet Explorer 4.01.

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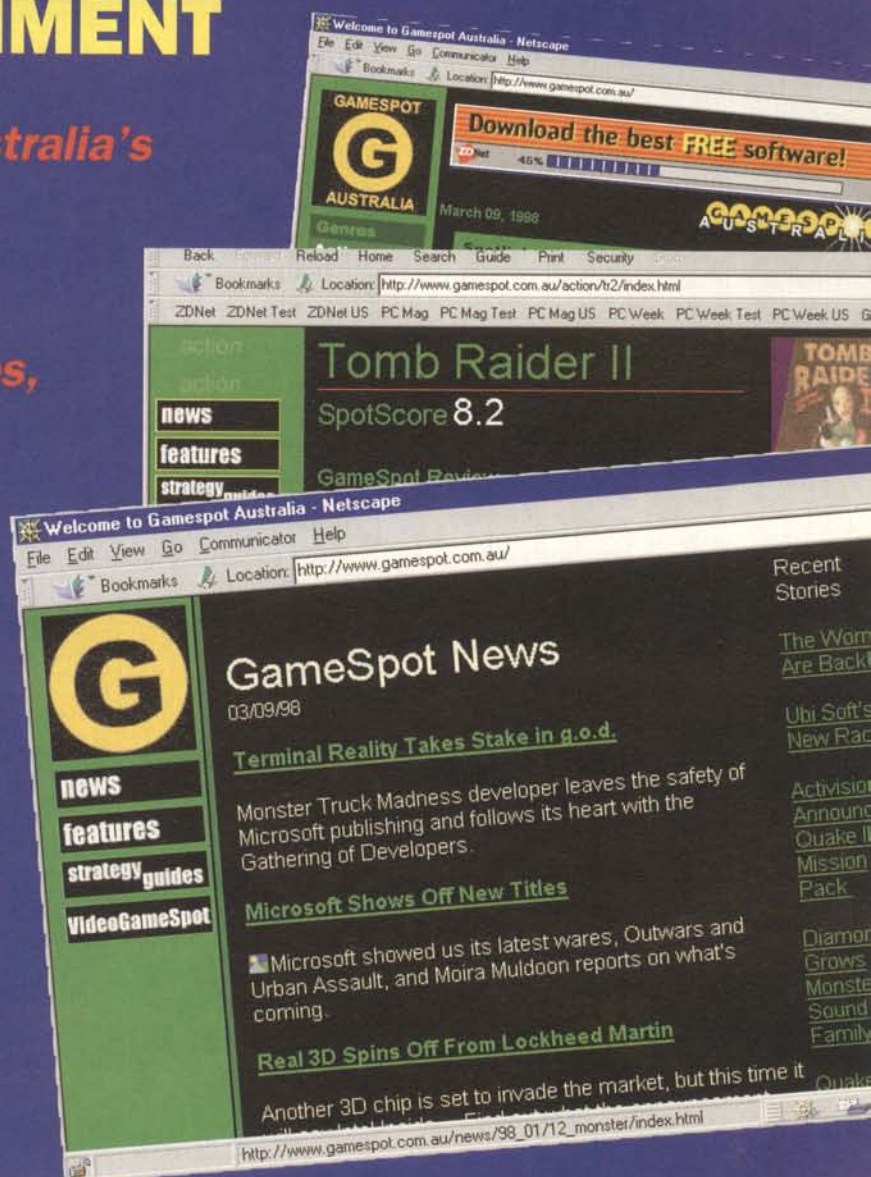
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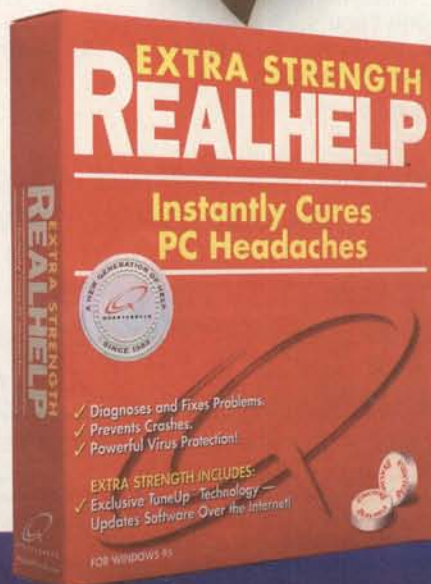
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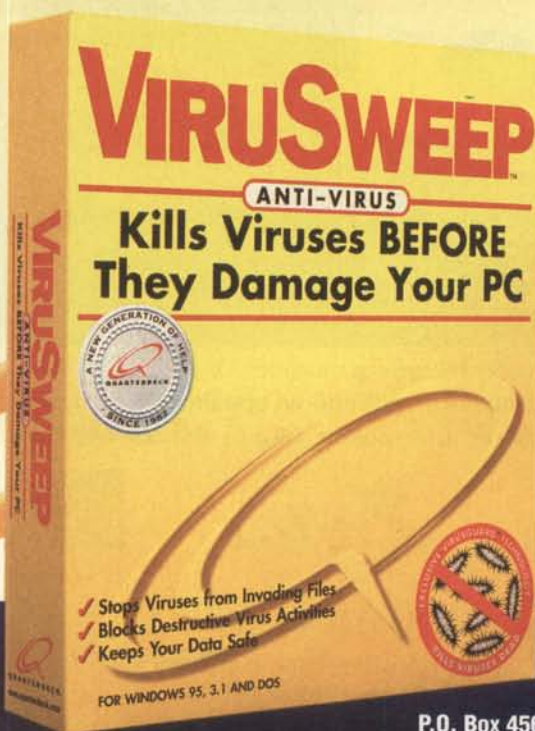


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PENTIUM 55 GIGABYTE 512MB MMX AGP MB
PENTIUM TRITON TXS 512MB MMX A-BIT MB
PENTIUM EPIC APOLLO 100P340 100MHz
PENTIUM II MOTHERBOARD ATX L-E-BX
PENTIUM II M5 GIGABYTE LX AGP 333MHz
PENTIUM II SPACEWALKER LX AGP 333MHz
PENTIUM II QDI MB LX WITH VIBRA 16 333MHz
PENTIUM II SPACEWALKER EX AGP Coloron
PENTIUM II SPACEWALKER BX AGP 100MHz
PENTIUM II M5 GIGABYTE BX AGP 100MHz
PENTIUM II MB ABIT BX AGP 100MHz

CPU'S MMX - PENTIUM II 400

AMD K6 P-300 CPU WITH MMX TECHNOLOGY
AMD K6 P-300 CPU WITH MMX TECH
AMD K6 II P-333 CPU WITH MMX TECH
AMD K6 II P-350 CPU WITH MMX TECH
PENTIUM II CELERON 266MHz MMX CPU
PENTIUM II CELERON 300MHz MMX CPU
PENTIUM II CELERON 300MHz MMX CPU
PENTIUM II CELERON 333MHz MMX CPU
PENTIUM II 300MHz MMX CPU INTEL GENUINE
PENTIUM II 333MHz MMX CPU INTEL GENUINE
PENTIUM II 350MHz MMX CPU INTEL GENUINE
PENTIUM II 400MHz MMX CPU INTEL GENUINE
PENTIUM II 450MHz MMX CPU INTEL GENUINE
CYRIX 586 66MHz 300 CPU M2 MMX CPU
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3.2 GIG FUJITSU ULTRA DMA HD DRIVE
3.2 GIG WESTERN DIGITAL ULTRA HD DRIVE
4.3 GIG SAMSUNG FUJITSU ULTRA HD DRIVE
4.3 GIG WESTERN DIGITAL ULTRA DMA HD
4.3 GIG BM ULTRA DMA HARD DISK DRIVE
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2MB EDO TRIDENT AGP VIDEO CARD
DSTEALTH 3D - 4000 PRO AGP 4MB

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DSTEALTH II - 220 4MB SDRAM RETAIL
DSTEALTH VIPER - 330 PCI 4 MB SDRAM
DSTEALTH VIPER - 330 PCI 4 MB SDRAM
DSTEALTH VIPER - 330 PCI 1 MB RETAIL
DSTEALTH MONSTER II 3D 12MB RETAIL CARD
DSTEALTH MONSTER II 3D 8MB RETAIL CARD
DSTEALTH II 6400 2D/3D AGP 8MB 1740 OEM
DSTEALTH II 6400 2D/3D AGP 8MB 1740 RETAIL
GB OR QDI AGP INTEL 740 8MB SDRAM CARD
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MATROX PRODUCTIVA G100 8MB AGP OEM
MATROX MYSTIQUE G200 8MB AGP OUT RET
MATROX MYSTIQUE G200 8MB AGP TUR OEM
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RAINBOW RUNNER TUR ISA BUS (FOR ABOVE)
G-SERIES RAINBOW RUNNER STUDIO CAPTURE
M20 GAMES CARD 4MB SDRAM NVIDIA 2 ADD ON
8 MB MATROX MILLENIUM II PCI VISA RETAIL
8 MB MATROX MILLENIUM G200 8MB AGP RETAIL
8 MB MATROX MILLENIUM G200 8MB AGP OEM

MEMORY RAM 4MB - 128MB

32 PIN 4 MEG SIMM STD 60NS
72 PIN 16 MEG D-SIMM STD 60NS
72 PIN 16 MEG SIMM STD 60NS
72 PIN 16 MEG EDO SIMM 50NS
72 PIN 16 MEG EDO SIMM 50NS
72 PIN 32 MEG EDO SIMM 50NS
168 PIN SDRAM DIMM MODULE 16MB 10NS
168 PIN SDRAM DIMM MODULE 32MB 10NS
168 PIN SDRAM DIMM MODULE 64MB EPROM
168 PIN SDRAM DIMM MODULE 64MB 100MHz
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MOUSE STD MS COMPATIBLE PS/2
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HP 695 COLOR INK JET PRINTER A4
HP 720 COLOR INK JET PRINTER A4
HP 890 CIO COLOR INK JET PRINTER
HP 1120 CIO COLOR INK JET PRINTER A3
HP 1600C DESK JET COLOR INK JET
HP LASER PRINTER 8PM A4
HP LASER PRINTER 8PM A4
HP OFFICE JET 1170C SCAN COPY/PRIN
HP OFFICE JET 590 SCAN COPY/PRIN
HP OFFICE JET 635C SCAN COPY/PRIN
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EPSON STYLUS COLOR 800 1200/360
EPSON STYLUS COLOR 800 1440/720
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EPSON STYLUS COLOR PHOTO EX
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FULL TOWER CASE LED W/PIS
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KIT SB16 & 32 SPD CD & S/W - PIONEER
KIT SB16 & 32 SPD CD & S/W - PANASONIC
KIT SB16 & 32 SPD CD INFRA & S/W
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CREATIVE VIBRA 16 BIT S/P D PNP
CREATIVE SB AWE64 CEM PNP VALUE
CREATIVE SB AWE64 GOLD PNP OEM
CREATIVE SB AWE64 GOLD PNP RETAIL
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32 SPEED CD-ROM DRIVE PIONEER
32 SPEED CD-ROM DRIVE INFRA REM
32 SPEED CD-ROM DRIVE PANASONIC
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JAZZ 32 SPEAKERS 200Watt 240V
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SONY MVC-FD1 DIGITAL CAMERA
SONY MVC-FD1 ZOOM DIG CAMERA
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AMD K6 II P-333 3D MMX 16MB
AMD K6 II P-350 3D MMX 16MB
CYRIX 586 M2 P-300 MMX 16MB
CYRIX 586 M2 P-300 MMX 16MB
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INTEL CELERON 300 32MB MMX ATX
INTEL CELERON 330 32MB MMX ATX
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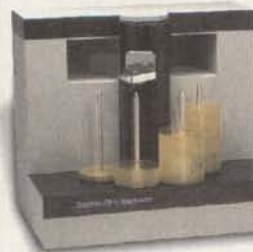
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CANON BJC 7000	12	C15
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EPSON STYLUS COLOUR 800/850/1520	12	E7
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HP DESKJET 720/890/OFFICEJET 1150	6	H13
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CANON BJC4000/4100/4200/4550 BCI-21	30	C9
EPSON STYLUS COLOUR/PRO/XL	6	E3
EPSON STYLUS COLOUR 820/111/IS	12	E5
EPSON STYLUS COLOUR 200/400/500/600/800	12	E8/E9
HP DESKJET COLOUR 400, 500 & 600 SERIES	12	H3/H5
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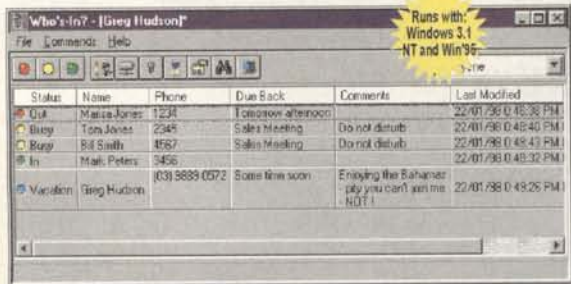
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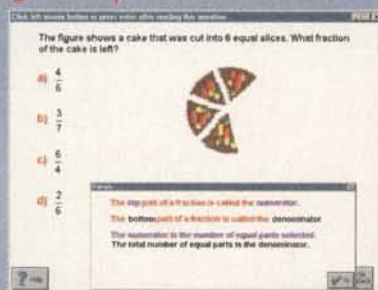
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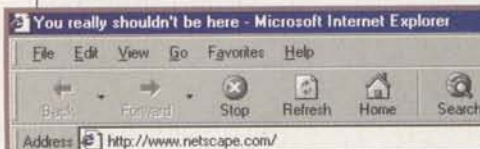
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Abort, Retry, Fail?

Just me and my baby and our Lexmark ink jet printers. (Ad in British edition of *PC Magazine*.)



This early prerelease version of Microsoft Windows NT Server has a dire title warning for anyone who types in Netscape's URL.



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- Turtle Beach Montego A3D64 Voice PCI Sound Card
- 40X Variable EIDE CD-ROM Drive
- 17" Colour Monitor (15.9" v.i.s.)
- Microsoft® IntelliMouse™
- Microsoft® Windows® 98
- McAfee Virus Scan
- 3 Year Limited Warranty

\$3,429*

or \$29 per week**

Upgrade options:

- 56K Capable U.S. Robotics X2 WinModem \$169
- from 6.4GB to 14.4GB Ultra ATA Hard Drive \$677
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- 40X Variable EIDE CD-ROM Drive
- 17" Colour Monitor (15.9" v.i.s.)
- Microsoft® IntelliMouse™
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- McAfee Virus Scan
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- ATI® 8MB 3D 2X AGP Integrated Graphics
- Yamaha 64 Voice Wavetable Integrated Sound
- 32X Variable EIDE CD-ROM Drive
- Harman Kardon HK195 Speakers
- 17" Colour Monitor (15.9" v.i.s.)
- Microsoft® IntelliMouse™
- Microsoft® Windows® 98
- McAfee Virus Scan
- 56K Capable U.S. Robotics X2 WinModem
- 3 Year Limited Warranty

\$2,699*

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Upgrade options:

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DELL® INSPIRON® 7000 D300GT INTEL® PENTIUM® II PROCESSOR 300MHz

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- 64MB SDRAM
- 6.4GB Ultra ATA Hard Drive
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- 4MB ATI® RAGE LT PRO 2X AGP Video Controller
- High-fidelity Audio SoundBlaster Compatible
- 24X Variable CD-ROM Drive
- 14.1" XGA Colour TFT Display
- Microsoft® Windows® 98
- 56K Data/Fax Modem
- Deluxe Carrying Case
- 1 Year Limited Warranty
- Free Lifetime Technical Support

\$6,259*

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Upgrade options:

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- 80MB SDRAM
- 4.0GB Ultra ATA Hard Drive
- 3.5" 1.44MB Diskette Drive
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- High-fidelity Audio SoundBlaster Compatible
- 24X Variable CD-ROM Drive
- 13.3" XGA Colour TFT Display
- Microsoft® Windows® 98
- 1 Year Limited Warranty
- Free Lifetime Technical Support

\$5,029*

or \$43 per week**

Upgrade options:

- 56K Data/Fax Modem \$282
- Iomega Zip 100MB Internal Drive \$282
- Deluxe Carrying Case \$111
- Call for a complete range of upgrades

DELL® INSPIRON® 3200 D266XT INTEL® PENTIUM® II PROCESSOR 266MHz

- 512KB L2 Pipeline Burst Cache
- 80MB SDRAM
- 4.0GB Ultra ATA Hard Drive
- 3.5" 1.44MB Diskette Drive
- 128-bit Graphics Accelerator
- High-fidelity Audio SoundBlaster Compatible
- 24X Variable CD-ROM Drive
- 13.3" XGA Colour TFT Display
- Microsoft® Windows® 98
- 1 Year Limited Warranty
- Free Lifetime Technical Support

\$4,479*

or \$38 per week**

Upgrade options:

- 56K Data/Fax Modem \$282
- Iomega Zip 100MB Internal Drive \$282
- Deluxe Carrying Case \$111
- Call for a complete range of upgrades



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- 19" Colour Monitor (17.9" v.i.s.)
- NEW Logitech Mouseman® Wheel (PS/2)
- Microsoft® Windows® 98
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- 56K Capable U.S. Robotics X2 WinModem
- Iomega Zip 100MB Internal Drive
- 3 Year Limited Warranty

\$5,849*

or \$50 per week**

Upgrade options:

- from 128MB to 256MB 100MHz SDRAM \$376
- 21" Trinitron® Monitor (19.8" v.i.s.) \$1,223
- Call for a complete range of upgrades

DELL DIMENSION® XPS R450 INTEL® PENTIUM® II PROCESSOR 450MHz

- Mini Tower Chassis
- 512KB Single Bank Pipeline Burst Cache
- 128MB 100MHz SDRAM
- 14.4GB Ultra ATA Hard Drive (7,200rpm)
- 3.5" 1.44MB Diskette Drive
- NEW STB 16MB 3D ZX AGP Graphics Card
- NEW Turtle Beach Montego II 320 Voice PCI Sound Card
- 40X Variable EIDE CD-ROM Drive
- Altec Lansing ACS-495 Full Dolby® Surround Sound Speakers with Subwoofer
- 19" Colour Monitor (17.9" v.i.s.)
- Microsoft® IntelliMouse™
- Microsoft® Windows® 98
- McAfee Virus Scan
- 56K Capable U.S. Robotics X2 WinModem
- Iomega Zip 100MB Internal Drive
- 3 Year Limited Warranty

\$5,449*

or \$46 per week**

Upgrade options:

- 4.8X DVD-ROM Drive and Decoder Card \$226
- 21" Trinitron® Monitor (19.8" v.i.s.) \$1,223
- Call for a complete range of upgrades

DELL DIMENSION® XPS R450 INTEL® PENTIUM® II PROCESSOR 450MHz

- Mini Tower Chassis
- 512KB Single Bank Pipeline Burst Cache
- 64MB 100MHz SDRAM
- NEW 12.9GB Ultra ATA Hard Drive (7,200rpm)
- 3.5" 1.44MB Diskette Drive
- ATI® Xpert 98D ZX 8MB 3D ZX AGP Graphics Card
- Turtle Beach Montego A3D64 Voice PCI Sound Card
- 40X Variable EIDE CD-ROM Drive
- Harman Kardon HK195 Speakers
- 17" Colour Monitor (15.9" v.i.s.)
- Microsoft® IntelliMouse™
- Microsoft® Windows® 98
- McAfee Virus Scan
- 56K Capable U.S. Robotics X2 WinModem
- 3 Year Limited Warranty

\$3,819*

or \$33 per week**

Upgrade options:

- 19" Colour Monitor (17.9" v.i.s.) \$461
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